



Veterinary Medicine

Agriculture & Natural Resources

Social Science

Human Ecology



Natural Science



1997 ANNUAL REPORT

S
75
M624
1997

SCI/TECH



MICHIGAN AGRICULTURAL EXPERIMENT STATION
MICHIGAN STATE UNIVERSITY



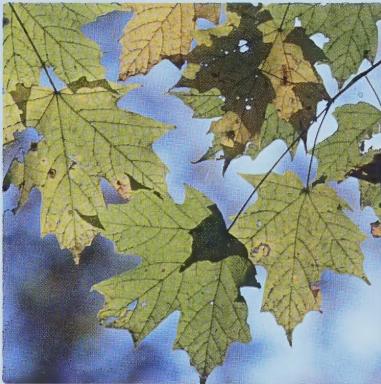
EX LIBRIS
UNIVERSITATIS
ALBERTENSIS



SEP 11 1998

1997

Annual Report



ALBERTA AGRICULTURE / PWSS LIBRARY
7000 - 113 STREET, EDMONTON
ALBERTA, CANADA T6H 5T6

*Michigan Agricultural Experiment Station
109 Agriculture Hall
Michigan State University
East Lansing, MI 48824-1039
517-355-0123*

Report prepared under the direction of J. Ian Gray, director of the Michigan Agricultural Experiment Station, and
Debbie McCaffrey, administrative assistant.

Design by Christine Altese; editing and production by Jamie DePolo, information officer, Outreach Communications.
All photos by Kurt Stepnitz, MSU photographer, except as indicated.

1997: Research that benefits Michigan citizens

In 1997, the Michigan Agricultural Experiment Station at Michigan State University reaffirmed its commitment to high quality research in agriculture, natural resources and the behavioral sciences for the benefit of Michigan residents.

- ◆ **In administrative personnel matters**, the MAES welcomed a new associate director and a new part-time assistant director.

Larry Olsen, associate professor of entomology, was named interim assistant vice provost and associate director of the MAES and MSU Extension in May. Prior to this appointment, he was the MSU integrated pest management coordinator for MSUE. Olsen's responsibilities include working as liaison with the MSUE area of expertise teams in agriculture and natural resources; representing the MAES and MSUE on field crop issues, including overseeing calls for research proposals; developing and coordinating a new natural resources coalition; overseeing the Southwest Michigan Research and Extension Center research and outreach programs; and representing MAES and MSUE at appropriate meetings, including North Central Region committees and commodity advisory councils.

Edward Mather, deputy director of the National Food Safety and Toxicology Center, was named quarter-time assistant director in October. Mather is overseeing microbial food initiatives funded by the MAES and has special responsibility as liaison to researchers in microbial food safety disciplines.

- ◆ **Though budgets are always a concern**, the MAES had a productive year directed by strategic planning.

All of the new buildings and renovations funded by the Revitalization of Animal Agriculture in Michigan Initiative have been completed. Faculty members in the departments of Animal Science and Food Science and Human Nutrition have returned to their offices in Anthony Hall. All the positions connected with the initiative have been filled, and the researchers are working with producers and commodity groups around the state and have begun to take advantage of external funding opportunities.

The MAES, MSUE and MSU received initial funding for their plan to address long-term research and extension needs in the Michigan plant industries, known as Project



Dr. J. Ian Gray

GREEEN (Generating Research and Extension to meet Economic and Environmental Needs). These initial funds are supporting a number of projects for plant producers and processors. The MAES is working with Michigan Farm Bureau and state commodity groups to produce a newsletter called

“Growing GREEEN” to keep all interested people updated on the progress of the project.

MAES scientists are also continuing to work on pesticide crisis areas in the state through the pesticides at risk (PAR) data base, which identifies the specialty crops in Michigan that are likely to be affected by the loss of critical pesticides in the next three years. Using the PAR data base, members of the Plant Industry Coalition — including growers, processors, researchers, agribusiness representatives and consumers — are working to establish priorities for plant research programs.

The National Food Safety and Toxicology Center was dedicated in October and will put MSU at the forefront of food safety issues, especially risk analysis. The building was constructed with multimillion dollar USDA funding and will house scientists with expertise in toxicology, carcinogenesis, pathology, bioanalytical chemistry, microbiology and epidemiology.

The MAES will be working in early 1998 to develop research initiatives in the areas of children, youth and family, and microbial food safety. Coalitions similar to those established for the plant and animal agriculture industries will be created to establish research priorities in natural resources and children, youth and families.

Five disciplinary grants were completed in 1996 and the results presented in a series of seminars sponsored jointly by the MAES and the researchers' academic departments. A new disciplinary grant program will begin in 1998.

Wheat 2000, a program to reverse the decline in the state's wheat production, is continuing. The program is creating an infrastructure for Michigan wheat that is as

strong and as profitable as the ones for corn and soybeans. Michigan will be one of 12 states that will receive federal funding for research on head blight, a devastating wheat disease.

To help sugar beet growers, MAES scientists and MSUE agents and specialists developed the Sugar Beet Advancement Committee (SBAC). Growers and representatives from agribusiness and sugar beet processing companies are also on the SBAC. Research on sugar beets continues at MSU, and the SBAC has hired an agronomist, Steve Poindexter, to work with farmers and sugar beet field representatives on long-term research to increase yields.

◆ **In personnel matters**, Ajit Srivastava was appointed chairperson of the Department of Agricultural Engineering after Robert von Bernuth returned to the faculty. Edward Grafius was named chairperson of the Department of Entomology after J. Mark Scriber returned to the faculty. Mark Uebersax was appointed chairperson of the Department of Food Science and Human Nutrition. He had been serving as interim chairperson. Dana Stewart was named chairperson of Human Environment and Design. Linda Good had been serving as acting chairperson and returned to the faculty. Willie Reed was named interim chairperson of the Department of Pathology after Charles Mackenzie was named associate director of research and international programs. Mark Whalon was named acting director of the Pesticide Research Center. He replaced Robert Hollingworth, who continues as director of the National Food Safety and Toxicology Center. Don Isleib, director of the Institute of International Agriculture, retired. His excellent contributions and advice to MAES international research programs will be missed.

Robert Huggett was named vice president for research and graduate studies. Huggett was formerly an assistant to EPA administrator Carol Browner. He is an experienced defender of research budgets and has fought for the development of new technologies that would benefit small businesses. Huggett has wide experience on academic and governmental task forces dealing with environmental issues and has published and co-authored more than 80 articles on environmental chemistry and the toxic effects of chemicals in water systems. A native

of Tidewater, Va., Huggett received his master's degree in marine chemistry from the Scripps Institution of Oceanography at the University of California at San Diego, and his doctoral degree in marine science from the College of William and Mary.

◆ **The MAES enjoys a strong and productive working relationship** with many commodity and processor groups and government agencies. The Partnership for Ecosystem Research and Management (PERM), a joint operating agreement between the MSU departments of Fisheries and Wildlife, Sociology, Geography, and Forestry, and the Michigan Department of Natural Resources Fisheries and Wildlife Division, and the Great Lakes Fishery Division, continues to flourish. Eight researchers are now part of this program.

The MAES is working with the Michigan Department of Agriculture on areas of joint concern, an experience that has been very rewarding for both groups as well as Michigan citizens and state agriculture.

Joint programs with MSUE are proceeding favorably. By working together, scientists, specialists and agents can respond in a positive, timely manner and assist Michigan citizens with areas of concern. The MAES will continue to work closely with MSUE.

The next year will again bring a new set of challenges and opportunities to Michigan agriculture and natural resources industries. By continuing to identify and provide the solutions to the problems of Michigan's citizens, the Michigan Agricultural Experiment Station is positioned to help propel the state forward and prepare it to be competitive in the next century.



J. Ian Gray, Director

Michigan Agricultural Experiment Station

ALBERTA AGRICULTURE / PWSS LIBRARY
7000 - 113 STREET, EDMONTON
ALBERTA, CANADA T6H 5T6

Michigan Agricultural Experiment Station

As of 11-1-97

J. Ian Gray, Associate Vice Provost and Director

Larry G. Olsen, Interim Associate Director

Janet L. Bokemeier, Assistant Director

Edward C. Mather, Assistant Director

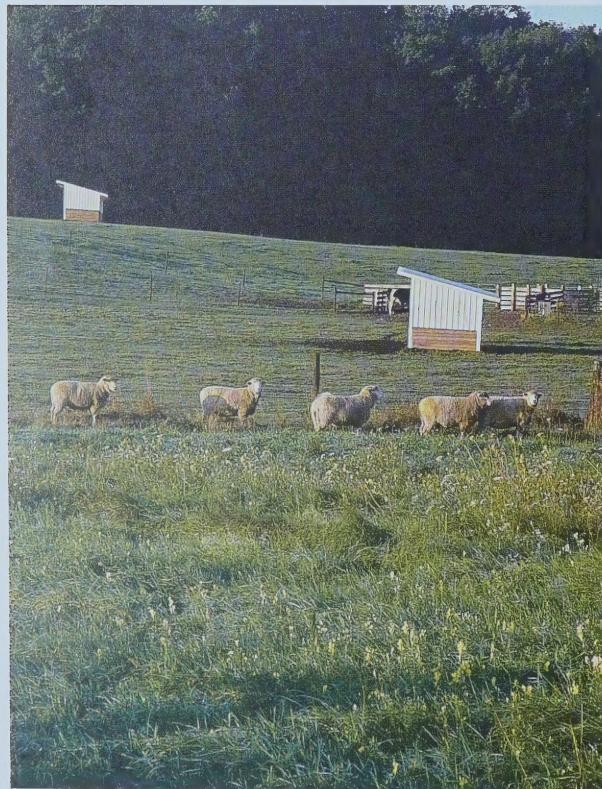
Doreen K. Woodward, Assistant Director

Debbie McCaffrey, Administrative Assistant

Martha Lovejoy, Support Staff

Nan Judy, Support Staff

Isidra Pérez, Support Staff



MAES Affiliated Deans

As of 10-1-97

Fred L. Poston, Vice Provost and Dean
College of Agriculture & Natural Resources

Julia R. Miller, Dean
College of Human Ecology

George E. Leroi, Dean
College of Natural Science

Kenneth E. Corey, Dean
College of Social Science

Lonnie J. King, Dean
College of Veterinary Medicine

MAES Unit Administrators

(Units receiving base funding)

As of 11-1-97

Kirk L. Heinze, Acting Chairperson
Agricultural and Extension Education

Larry G. Hamm, Chairperson
Agricultural Economics

Ajit K. Srivastava, Chairperson
Agricultural Engineering

Maynard G. Hogberg, Chairperson
Animal Science

William L. Smith, Chairperson
Biochemistry

Gustaaf A. de Zoeten, Chairperson
Botany and Plant Pathology

Boyd G. Ellis, Chairperson
Crop and Soil Sciences

Karen L. Klomparens, Director
Center for Electron Optics

Edward J. Grafius, Chairperson
Entomology

Marjorie J. Kostelnik, Chairperson
Family and Child Ecology

William W. Taylor, Chairperson
Fisheries and Wildlife

Mark A. Uebersax, Chairperson
Food Science and Human Nutrition

Daniel E. Keathley, Chairperson
Forestry

René C. Hinojosa, Chairperson
Geography

Wayne H. Loescher, Chairperson
Horticulture

Dana G. Stewart, Chairperson
Human Environment and Design

Michael J. Klug, Director
Kellogg Biological Station

C. Gerald Haarer, Director
Land Management

Frederik J. Derksen, Chairperson
Large Animal Clinical Sciences

Jerry B. Dodgson, Chairperson
Microbiology

Robert M. Hollingworth, Director
National Food Safety and Toxicology Center

Mary E. Harvey, Acting Director
Outreach Communications

Bruce R. Harte, Director
School of Packaging

Joseph D. Fridgen, Chairperson
Park, Recreation and Tourism Resources

Willie M. Reed, Interim Chairperson
Pathology

Mark E. Whalon, Acting Director
Pesticide Research Center

William S. Spielman, Chairperson
Physiology

Kenneth Keegstra, Director
MSU-DOE Plant Research Laboratory

Richard E. Groop, Director
Center for Remote Sensing

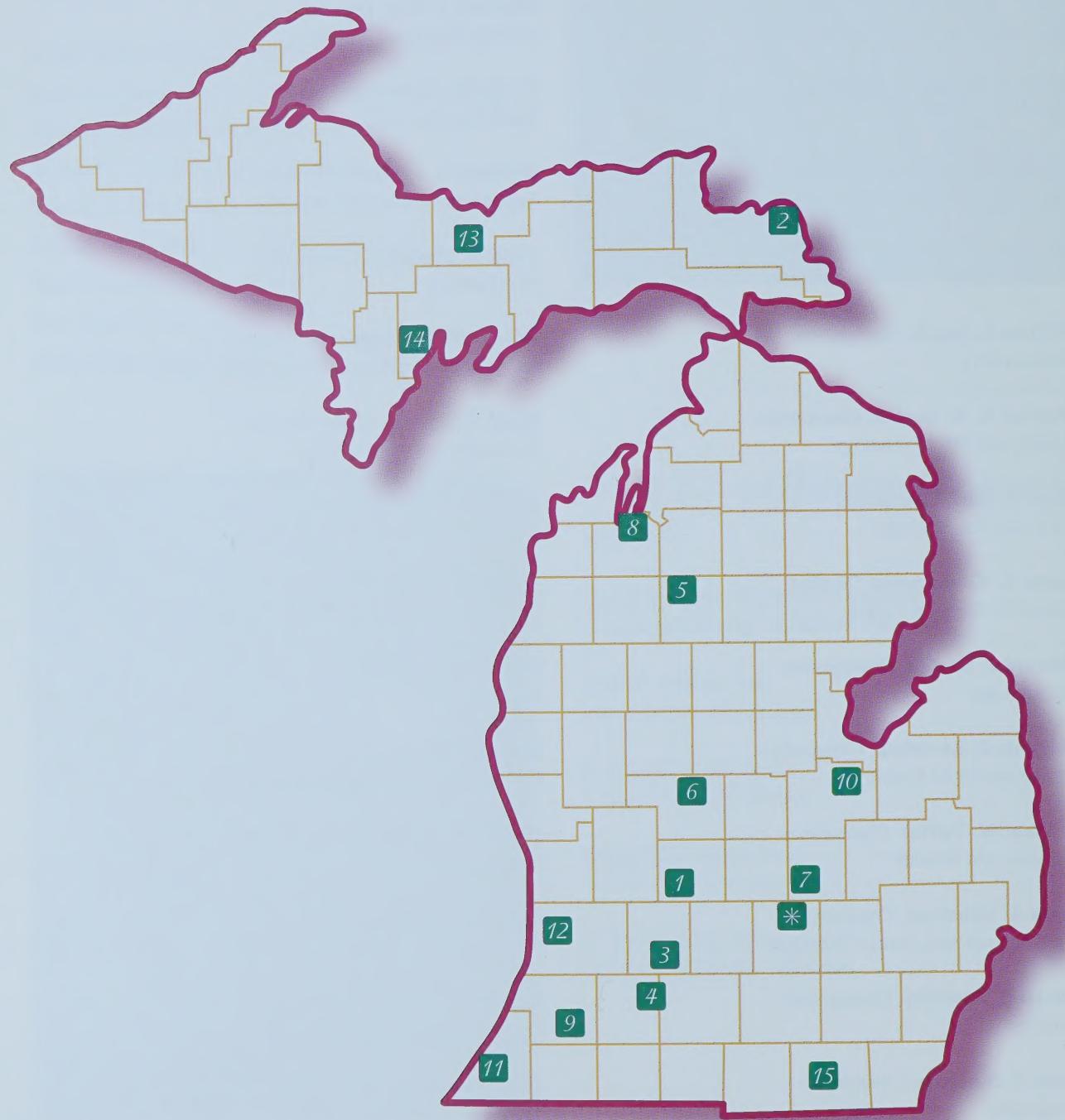
Jon F. Bartholic, Director
Institute of Water Research

Cynthia C. Fridgen, Chairperson
Resource Development

Christopher K. Vanderpool, Chairperson
Sociology

Michigan Agricultural Experiment Station
Outlying Stations — 10-1-97

MAES OUTLYING STATIONS



1. CLARKSVILLE HORTICULTURAL EXPERIMENT STATION

Established 1974
 9302 Portland Road
 Clarksville, MI 48815
 Phone: (616) 693-2193
 FAX: (616) 693-2317
 Gerald Skeltis
Farm Manager
 Phil Schwallier
Coordinator
 Case DeYoung
Horticulturist

2. DUNBAR FOREST EXPERIMENT STATION

Established 1925
 12839 S. Scenic Drive
 Rt. 1, Box 179
 Sault Ste. Marie, MI 49783
 Phone: (906) 632-3932 or
 (906) 786-1575
 Ray Miller
Nonresident Forester

3. W. K. KELLOGG BIOLOGICAL STATION

Established 1928
 3700 E. Gull Lake Drive
 Hickory Corners, MI 49060
 FAX: (616) 671-2351
 Bernie Knezek (517) 353-4569
Director, Agricultural Programs
 Mike Klug (616) 671-2341
Director, Programs and Development

4. W. K. KELLOGG EXPERIMENTAL FOREST

Established 1932
 7060 N. 42nd Street
 Augusta, MI 49012
 Phone: (616) 731-4597
 FAX: (616) 731-4597
 Greg Kowalewski
Resident Forester

5. LAKE CITY EXPERIMENT STATION

Established 1928
 5401 W. Jennings Road
 Lake City, MI 49651
 Phone: (616) 839-4608
 Doug Nielsen
Farm Manager

6. MONTCALM RESEARCH FARM

Established 1966
 4747 McBrides Road
 Lakeview, MI 48850
 Phone: (517) 365-3473
 Richard Crawford
Research Technician

7. MUCK SOILS RESEARCH FARM

Established 1941
 Rt. 3
 9370 E. Herbison Road
 Laingsburg, MI 48848
 Phone: (517) 641-4062
 Ron Gnagey
Farm Manager

8. NORTHWEST MICHIGAN HORTICULTURAL RESEARCH STATION

Established 1979
 6686 S. Center Highway
 Traverse City, MI 49684
 Phone: (616) 946-1510
 FAX: (616) 946-1404
 James Nugent
Coordinator
 Bill Klein
Farm Manager

9. FRED RUSS FOREST EXPERIMENT STATION

Established 1942
 20673 Marcellus Highway
 Decatur, MI 49045
 Phone: (616) 782-5652 or
 (616) 731-4597
 Greg Kowalewski
Nonresident Forester

10. SAGINAW VALLEY BEET AND BEAN RESEARCH FARM

Established 1971
 3066 S. Thomas Road
 Saginaw, MI 48603
 Phone: (517) 781-1160
 FAX: (517) 781-5282
 Paul Horny
Farm Manager

11. SOUTHWEST MICHIGAN RESEARCH AND EXTENSION CENTER

Established 1987
 1791 Hillandale Road
 Benton Harbor, MI 49022
 Phone: (616) 944-1477
 FAX: (616) 944-3106
 James Ertman
Farm Manager
 Thomas Zabadal
Coordinator

12. TREVOR NICHOLS RESEARCH COMPLEX

Established 1967
 6237 124th Avenue
 Fennville, MI 49408
 Phone: (616) 561-5040
 FAX: (616) 561-5314
 Matthew Daly
Farm Manager

13. UPPER PENINSULA EXPERIMENT STATION

Established 1899
 102 University Drive
 Chatham, MI 49816
 Phone: (906) 439-5114
 FAX: (906) 439-5698
 Paul Naasz
Operations Supervisor

14. UPPER PENINSULA TREE IMPROVEMENT CENTER

Established 1986
 6005 J Road
 Escanaba, MI 49829
 Phone: (906) 786-1575
 FAX: (906) 786-9370
 Ray Miller
Resident Forester

15. MSU MERILLAT EQUINE CENTER

Established 1997
 2828 Wolf Creek Highway
 Adrian, MI 49221
 Phone: (517) 265-6779
 FAX: (517) 263-9294
 Shorty Parks
Farm Manager

★ EAST LANSING FIELD RESEARCH FACILITIES

Established 1888
 109 Agriculture Hall
 East Lansing, MI 48824-1039
 Phone: (517) 355-3272
 FAX: (517) 353-5406
 C. Gerald Haarer
Director, Land Management

Alphabetical List of MAES Scientists

As of 10-1-97

Faculty members with dual MAES appointments are listed in both of the departments in which they serve.

NAME	DEPARTMENT	NAME	DEPARTMENT
Adams, Gerard C.	Botany and Plant Pathology	Burton, Zachary F.	Biochemistry
Allen, Michael	Animal Science	Busch, Lawrence M.	Sociology
Allison, Richard F.	Botany and Plant Pathology	Bush, Guy L.	Kellogg Biological Station
Aulerich, Richard J.	Animal Science	Buskirk, Daniel	Animal Science
Ayers, George S.	Entomology	Cameron, Arthur C.	Horticulture
Bagdasarian, Michael	Microbiology	Campa, Henry III	Fisheries and Wildlife
Baird, James H.	Crop and Soil Sciences	Carlson, William H.	Horticulture
Baker, John C.	Large Animal Clinical Sciences	Cash, Jerry N.	Food Science and Human Nutrition
Bakker-Arkema, Fred W.	Agricultural Engineering	Champness, Wendy C.	Microbiology
Balander, Richard J.	Animal Science	Chenoweth, Wanda L.	Food Science and Human Nutrition
Banks, Bobby D.	Animal Science	Chou, Karen	Animal Science
Bates, Ronald O.	Animal Science	Christenson, Donald R.	Crop and Soil Sciences
Batie, Sandra S. ¹	Agricultural Economics	Clarke, Robert	Packaging
Beaudry, Randolph M.	Horticulture	Coe, Paul H.	Animal Science
Beede, David ⁵	Animal Science	Coon, Thomas G.	Fisheries and Wildlife
Behe, Bridget K.	Horticulture	Copeland, Lawrence O.	Crop and Soil Sciences
Bell, Thomas G.	Pathology	Coussens, Paul M.	Animal Science
Bence, James R. ⁶	Fisheries and Wildlife	Crawford, Eric W.	Agricultural Economics
Bennink, Maurice R.	Food Science and Human Nutrition	Crum, James L.	Crop and Soil Sciences
Benson, Margaret	Animal Science	de Bruijn, Frans J.	Microbiology
Berglund, Kris A.	Agricultural Engineering	de Bruijn, Frans J.	Plant Research Laboratory
Bickert, William G.	Agricultural Engineering	D'Itri, Frank R.	Institute of Water Research
Biernbaum, John A.	Horticulture	Dazzo, Frank B.	Crop and Soil Sciences
Bingen, R. James	Resource Development	Dazzo, Frank B.	Microbiology
Bird, George W.	Entomology	Dersch, Eckhart	Resource Development
Black, J. Roy	Agricultural Economics	DiFonzo, Christina D.	Pesticide Research Center
Bokemeier, Janet L.	Sociology	Dickmann, Donald I.	Forestry
Bond, Jenny T.	Food Science and Human Nutrition	Diers, Brian W.	Crop and Soil Sciences
Booren, Alden M.	Food Science and Human Nutrition	Dilley, David R.	Horticulture
Bourquin, Leslie D.	Food Science and Human Nutrition	Dong, Ke	Entomology
Boyd, Stephen A.	Crop and Soil Sciences	Douches, David S.	Crop and Soil Sciences
Bremigan, Mary T. ⁶	Fisheries and Wildlife	Doumit, Matthew E.	Food Science and Human Nutrition
Breznak, John A.	Microbiology	Doumit, Matthew E.	Animal Science
Bristow, Catherine	Entomology	Downes, Theron W.	Packaging
Bronstein, Daniel A.	Resource Development	Dukelow, W. Richard	Physiology
Brook, Roger C.	Agricultural Engineering	Dukelow, W. Richard	Animal Science
Bucholtz, Herbert F.	Animal Science	Edens, Thomas C.	Entomology
Burkhardt, Thomas H.	Agricultural Engineering	Edens, Thomas C.	Resource Development
Bursian, Steven	Animal Science	Edson, Charles E.	Pesticide Research Center
Burton, Jeanne L.	Animal Science	Eicher, Carl K.	Agricultural Economics

NAME	DEPARTMENT
Epperson, Bryan K.	Forestry
Ernst, Catherine W.	Animal Science
Erskine, Ronald J.	Large Animal Clinical Sciences
Ewart, Lowell C.	Horticulture
Ferris, Theodore A.	Animal Science
Flore, James A.	Horticulture
Fogwell, Ralph L.	Animal Science
Foster, Eunice F.	Crop and Soil Sciences
Fraker, Pamela J.	Biochemistry
Freed, Russell D.	Crop and Soil Sciences
Fried, Jeremy S.	Forestry
Fulbright, Dennis W.	Botany and Plant Pathology
Gage, Douglas A.	Biochemistry
Gage, Stuart H.	Entomology
Garling, Donald L.	Fisheries and Wildlife
Gerrish, John B.	Agricultural Engineering
Giacin, Jack R.	Packaging
Giesy, John P.	National Food Safety and Toxicology Center
Gomez-Duran, Charles O.	Large Animal Clinical Sciences
Grooms, Daniel L.	Large Animal Clinical Sciences
Grumet, Rebecca	Horticulture
Güt, Larry	Entomology
Guyer, Daniel E.	Agricultural Engineering
Hammerschmidt, Raymond	Botany and Plant Pathology
Hancock, James F.	Horticulture
Hanson, Eric J.	Horticulture
Hanson, Steven D.	Agricultural Economics
Harkema, Jack	Pathology
Harris, Craig K.	Sociology
Harsh, Stephen B.	Agricultural Economics
Hart, James B., Jr.	Forestry
Hart, L. Patrick	Botany and Plant Pathology
Harwood, Richard R. ²	Crop and Soil Sciences
Hausbeck, Mary K.	Botany and Plant Pathology
Hausinger, Robert P.	Biochemistry
Hausinger, Robert P.	Microbiology
Hawkins, David R.	Animal Science
Hayes, Daniel B. ⁶	Fisheries and Wildlife
He, Sheng-Yang	Botany and Plant Pathology
Heins, Royal D.	Horticulture
Herdt, Thomas H.	Large Animal Clinical Sciences
Hernandez, Ruben J.	Packaging
Herner, Robert C.	Horticulture
Hesterman, Oran B.	Crop and Soil Sciences
Hill, Gretchen M.	Animal Science
Hoehn, John P.	Agricultural Economics
Hoerr, Sharon M.	Food Science and Human Nutrition
Holecek, Donald F.	Park, Recreation and Tourism Resources
Holland, Margo S.	Pathology
Holland, Robert E.	Large Animal Clinical Sciences
Howe, Gregg A.	Plant Research Laboratory
Howell, Gordon S.	Horticulture
Iezzoni, Amy F.	Horticulture
Imig, David R.	Family and Child Ecology
Ireland, James J.	Animal Science
Jacobs, Lee W.	Crop and Soil Sciences
Jarosz, Andrew M.	Botany and Plant Pathology
Johnson, Nan E.	Sociology
Jones, Alan L.	Botany and Plant Pathology
Jones, Michael L. ⁶	Fisheries and Wildlife
Jump, Donald B.	Physiology
Kaguni, Jon M.	Biochemistry
Kakela, Peter J.	Resource Development
Kamdem, Donatiens-Pascal	Forestry
Kaneene, John B.	Large Animal Clinical Sciences
Keefe, Dennis R.	Family and Child Ecology
Keith, Joanne G.	Family and Child Ecology
Kells, James J., Jr.	Crop and Soil Sciences
Kelly, James D.	Crop and Soil Sciences
Kelly, John F.	Horticulture
Kielbaso, Julian J.	Forestry
Kindel, Paul K.	Biochemistry
Klug, Michael J.	Microbiology
Knezek, Bernard D.	Crop and Soil Sciences
Kobe, Richard K.	Forestry
Koontz, Stephen R.	Agricultural Economics
Kroos, Lee R.	Biochemistry



NAME	DEPARTMENT	NAME	DEPARTMENT
Landis, Douglas A.	Entomology	Peyton, R. Benny	Fisheries and Wildlife
Lantagne, Douglas O.	Forestry	Pierce, Francis J.	Crop and Soil Sciences
Lee, Julian J. L.	Packaging	Poff, Ken	Botany and Plant Pathology
Leefers, Larry A.	Forestry	Potter-Witter, Karen L.	Forestry
Leep, Richard H.	Crop and Soil Sciences	Prather, L. Alan	Botany and Plant Pathology
Lenski, Richard E. ³	Crop and Soil Sciences	Preiss, Jack	Biochemistry
Levine, S. Joseph	Ag and Extension Education	Price, James F.	Food Science and Human Nutrition
Li, Weiming ⁶	Fisheries and Wildlife	Prince, Harold H.	Fisheries and Wildlife
Linz, John E.	Food Science and Human Nutrition	Propst, Dennis B.	Park, Recreation and Tourism Resources
Liu, Jianguo ⁶	Fisheries and Wildlife	Pysarchik, Dawn I.	Human Environment and Design
Lloyd, James W.	Agricultural Economics	Raikhel, Alexander S.	Entomology
Loudon, Theodore L.	Agricultural Engineering	Ramm, Carl W.	Forestry
Lownds, Norman K.	Horticulture	Reddy, C. Adinarayana	Microbiology
Maes, Roger K.	Microbiology	Renner, Karen A.	Crop and Soil Sciences
Mao, Ivan Ling	Animal Science	Ricks, Donald J.	Agricultural Economics
Martin, Laura L.	Agricultural Economics	Rieke, Paul E.	Crop and Soil Sciences
McCullough, Deborah G.	Entomology	Ritchie, Harlan D.	Animal Science
McDonough, Maureen H.	Forestry	Ritchie, Joe T. ⁴	Crop and Soil Sciences
McGroarty, Estelle J.	Biochemistry	Robertson, G. Philip	Crop and Soil Sciences
McNabb, Clarence D.	Fisheries and Wildlife	Robinson, Norman E.	Large Animal Clinical Sciences
Melakerberhan, Haddish	Entomology	Robison, Lindon J.	Agricultural Economics
Merritt, Richard W.	Entomology	Rochin, Refugio I.	Agricultural Economics
Miller, James R.	Entomology	Rogers, John N. III.	Crop and Soil Sciences
Mokma, Delbert L.	Crop and Soil Sciences	Romsos, Dale R.	Food Science and Human Nutrition
Myers, Robert S.	Agricultural Economics	Rook, Joseph S.	Large Animal Clinical Sciences
Nair, Muraleedharan G.	Horticulture	Rosenbaum, Rene P.	Resource Development
Nelson, Charles M.	Park, Recreation and Tourism Resources	Rowe, D. Bradley	Horticulture
Ng, Perry K. W.	Food Science and Human Nutrition	Rozeboom, Dale	Animal Science
Nielsen, Brian D.	Animal Science	Rust, Steven	Animal Science
Norris, Patricia E.	Agricultural Economics	Safir, Gene R.	Botany and Plant Pathology
Norris, Patricia E.	Resource Development	Sang, Tao	Botany and Plant Pathology
Oehmke, James F.	Agricultural Economics	Sawyer, Carol A.	Food Science and Human Nutrition
Ofoli, Robert Y.	Food Science and Human Nutrition	Schabenberger, Oliver	Crop and Soil Sciences
Ohlrogge, John B.	Botany and Plant Pathology	Schemmel, Rachelle A.	Food Science and Human Nutrition
Orth, Michael	Animal Science	Schiemberg, Lawrence R.	Family and Child Ecology
Osburn, Wesley N.	Food Science and Human Nutrition	Schindler, Melvin S.	Biochemistry
Osburn, Wesley N.	Animal Science	Schmid, A. Allan	Agricultural Economics
Padgett, George A.	Pathology	Schmidt, Thomas M.	Microbiology
Patterson, Jon S.	Pathology	Schroeder, Joseph J.	Food Science and Human Nutrition
Paul, Eldor A.	Crop and Soil Sciences	Schultink, Gerhardus	Resource Development
Penner, Donald	Crop and Soil Sciences	Schutzki, Robert E.	Horticulture
Perry, Ronald L.	Horticulture	Schwab, Gerald D.	Agricultural Economics
Person, Howard L.	Agricultural Engineering	Schwarzeweller, Harry K.	Sociology
Pestka, James J.	Food Science and Human Nutrition	Schweikhardt, David B.	Agricultural Economics
Peterson, H. Christopher	Agricultural Economics	Scriber, J. Mark	Entomology

NAME	DEPARTMENT	NAME	DEPARTMENT
Sears, Barbara B.	Botany and Plant Pathology	Walker, Rosemary A.	Family and Child Ecology
Sears, Phillip	Large Animal Clinical Sciences	Walton, Jonathan D.	Plant Research Laboratory
Segerlind, Larry J.	Agricultural Engineering	Wang, John L.	Biochemistry
Singh, Sher Paul	Packaging	Ward, Richard W.	Crop and Soil Sciences
Sink, Kenneth C.	Horticulture	Warncke, Darryl D.	Crop and Soil Sciences
Slocum, Ann C.	Human Environment and Design	Watson, J. Throck	Biochemistry
Smith, Denise M.	Food Science and Human Nutrition	Weber, Michael T.	Agricultural Economics
Smith, George W.	Animal Science	Whims, Fred R.	Ag and Extension Education
Smitley, David R.	Entomology	Widders, Irvin E.	Horticulture
Smucker, A.J.M.	Crop and Soil Sciences	Wilkinson, Robert H.	Agricultural Engineering
Song, Won O.	Food Science and Human Nutrition	Winterstein, Scott R.	Fisheries and Wildlife
Sontag, M. Suzanne	Human Environment and Design	Witter, Scott G.	Resource Development
Soranno, Patricia A.	Fisheries and Wildlife	Yokoyama, Melvin T.	Animal Science
Staatz, John S.	Agricultural Economics	Zabadal, Thomas J.	Horticulture
Steffe, James F.	Food Science and Human Nutrition	Zabik, Mary E.	Food Science and Human Nutrition
Steffe, James F.	Agricultural Engineering	Zabik, Matthew J.	Entomology
Stehr, Frederick W.	Entomology	Zabik, Matthew J.	Pesticide Research Center
Sternquist, Brenda J.	Human Environment and Design	Zacharewski, Timothy R.	National Food Safety and Toxicology Center
Stevens, James A.	Forestry	Zandstra, Bernard H.	Horticulture
Strasburg, Gale M.	Food Science and Human Nutrition	Zanella, Adroaldo	Animal Science
Straw, Barbara	Large Animal Clinical Sciences	Zile, Maija H.	Food Science and Human Nutrition
Stynes, Daniel J.	Park, Recreation and Tourism Resources		
Surbrook, Truman C.	Agricultural Engineering		
Suvedi, Murari	Ag and Extension Education		
Swinton, Scott M.	Agricultural Economics		
Tempelman, Robert	Animal Science		
Thiem, Suzanne	Entomology		
Thomashow, Michael F.	Crop and Soil Sciences		
Thomashow, Michael F.	Microbiology		
Tiedje, James M.	Crop and Soil Sciences		
Tiedje, James M.	Microbiology		
Trail, Frances	Botany and Plant Pathology		
Trienzenberg, Steven J.	Biochemistry		
Trottier, Nathalie	Animal Science		
Tucker, H. Allen	Animal Science		
Ustunol, Zeynep	Food Science and Human Nutrition		
Van Ee, Gary R.	Agricultural Engineering		
VandeHaar, Michael	Animal Science		
Vander Stoep, Gail A.	Park, Recreation and Tourism Resources		
van Ravenswaay, Eileen O.	Agricultural Economics		
Vargas, Joseph M., Jr.	Botany and Plant Pathology		
Velicer, Leland F.	Microbiology		
Vitosh, Maurice L.	Crop and Soil Sciences		
von Bernuth, Robert D.	Agricultural Engineering		
Walker, Edward D.	Entomology		

¹ Elton Smith Endowed Chair² C.S. Mott Distinguished Professor of Sustainable Agriculture³ Hannah Professor for Microbial Ecology and Plant Sciences⁴ Nowlin Professor for Water Research (50 percent of the appointment is paid by the endowment)⁵ Clinton Meadows Chair⁶ Partnerships for Ecosystem Research and Management (PERM) positions with salary funded by the Michigan Department of Natural Resources

MAES Scientists and Projects by Department

The names listed here represent faculty members who have an MAES appointment and are in the tenure stream as of 10-1-97. Faculty members with dual MAES appointments are listed in both of the departments in which they serve.

SCIENTISTS	PROJECTS
MAES = Michigan Agricultural Experiment Station	Projects listed are as of 10-1-97.
MSUE = Michigan State University Extension	*Signifies Regional Research Project
Joint = Joint appointment in an MAES-affiliated College or Department	
12 = Professor	
13 = Associate Professor	
14 = Assistant Professor	



Agricultural and Extension Education

Phone: 355-6580



FACULTY

	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Levine, S. Joseph	12	0.20	0.50	0.30	Faculty Development
Suvedi, Murari	13	0.25	0.50	0.25	Program Evaluation
Whims, Fred R.	12	0.12	0.40	0.48	Extension Education/Rural Education
TOTALS:		0.57	1.40	1.03	

Kirk L. Heinze, Acting Chair

PROJECTS

MICL01752* The Adoption of Sustainable Farming Systems: Implications to Agricultural Education
 MICL03316 Assessing Retailer/Consumer Perceptions and Use of Michigan-Produced Commodities

Levine, J.
 Heinze, K.

Agricultural Economics

Phone: 355-4563



FACULTY

	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Batie, Sandra S. ¹	12	0.60	0.20	0.20	Food and Agriculture Policy
Black, J. Roy	12	0.80	0.00	0.20	Farm Management
Crawford, Eric W.	12	0.40	0.35	0.25	International Development
Eicher, Carl K.	12	0.50	0.00	0.50	International Development
Hanson, Steven D.	13	0.80	0.00	0.20	Agricultural Finance
Harsh, Stephen B.	12	0.20	0.65	0.15	Farm Management

Larry G. Hamm, Chair

Agricultural Economics (continued)

	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Hoehn, John P.	12	0.70	0.00	0.30	Resource Development
Koontz, Stephen R.	14	0.75	0.00	0.25	Livestock Industry Marketing
Lloyd, James W.	13	0.20	0.00	0.80	Livestock Production/Health Management/Food Safety
Martin, Laura L.	14	0.50	0.50	0.00	Livestock Industry Management
Myers, Robert S.	13	0.80	0.00	0.20	International Trade & Price Analysis
Norris, Patricia E.	14	0.12	0.30	0.58	Land Use Management/Public Resource Economics
Oehmke, James F.	13	0.75	0.00	0.25	Price Analysis & Research Policy
Peterson, H. Christopher	13	0.18	0.00	0.82	Agribusiness
Ricks, Donald J.	12	0.20	0.70	0.10	Marketing
Robison, Lindon J.	12	0.65	0.00	0.35	Production Economics
Rochin, Refugio I.	12	0.18	0.00	0.82	International Rural & Community Development/Ethnic Minority Groups
Schmid, A. Allan	12	0.60	0.00	0.40	Land Economics/Public Policy
Schwab, Gerald D.	12	0.15	0.50	0.35	Farm Management
Schweikhhardt, David B.	13	0.25	0.40	0.35	Agricultural Trade Policy
Staatz, John S.	12	0.25	0.00	0.75	International Development
Swinton, Scott M.	13	0.70	0.00	0.30	Production Economics
van Ravenswaay, Eileen O.	12	0.75	0.00	0.25	Public Policy/Food Safety
Weber, Michael T.	12	0.80	0.00	0.20	International Development
TOTALS:		11.83	3.60	8.57	

PROJECTS

MICL01518*	Benefits and Costs of Resource Policies Affecting Public and Private Land	Hoehn, J.
MICL01519*	Private Strategies, Public Policies, and Food System Performance	van Ravenswaay, E.
MICL01530*	Economic Issues Affecting the U.S. Fruit and Vegetable System	Ricks, D.
MICL01576*	Farm Information Systems	Harsh, S.
MICL01625	Financial Decision Making and Investment in Agriculture	Hanson, S.
MICL01635	Collective Action in Agriculture, Natural Resources and Rural Development	Schmid, A.
MICL01660*	Regulatory, Efficiency and Management Issues Affecting Rural Financial Markets	Hanson, S.
MICL01666*	Impact Analyses and Decision Strategies for Agricultural Research	Oehmke, J.
MICL01690	Livestock Health Management Economics and the Safety of Animal-Origin Foods	Lloyd, J.
MICL01702	Economic Institutions, Organizational Behavior and Food Systems Performance	Shaffer, J.
MICL01712	Agricultural Production Economics and Environmental Risk Management	Swinton, S.
MICL01713	Agribusiness Competitiveness and Management Strategies	Peterson, H.
MICL01732	National and International Agricultural Policies and Policy Decision Processes	Schweikhhardt, D.
MICL01737	Changing Private and Public Roles in Technology Development, Technology Transfer and Seed Distribution	Eicher, C.
MICL01744	Agricultural Economics Research on International Agricultural Development and Environmental Issues	Eicher, C.
MICL01770	Economic Analysis of Public Policies Affecting the Performance of Michigan Agriculture	Batie, S.
MICL01788	Economic Analysis of Tactical and Operational Decisions on Farms and Design/Development of Information Systems	Harsh, S.
MICL01790	Structural Adjustments in Michigan's Pork and Beef Sectors	Black, J.
MICL01815	The Political Economy of U.S. Agricultural Research, Commodity and Trade Policy	Oehmke, J.
MICL01844	Risk Analysis and Management in U.S. Agriculture	Myers, R.

Agricultural Economics

(continued)

MICL01850	The Role of Information and Market Transactions in Land Use Policy	Norris, P.
MICL03333	Improved Marketing and Competitiveness for Michigan Fruit Industries	Ricks, D.
MICL03356	Economics of Vertical Coordination and Intensive Production in Michigan's Livestock Industries	Martin, L.
MICL08150	Modifying Contracts in Agriculture to Achieve Nonpoint Pollution Control	Batie, S.
MICL08153	Rural <i>Colonias</i> in the Southwest: Conditions and Implications	Rochin, R.
MICL08157	The Economic and Environmental Impacts of Industrialization in the U.S. Pork Industry	Myers, R.

Agricultural Engineering

Phone: 355-4720

Ajit K. Srivastava,
Chair

FACULTY		RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Bakker-Arkema, Fred W.		12	0.65	0.00	0.35	Grain Dry Storage
Berglund, Kris A.		12	0.49	0.00	0.51	Biotechnology/Food Engineering
Bickert, William G.		12	0.20	0.80	0.00	Livestock Facilities/Environment
Brook, Roger C.		12	0.25	0.75	0.00	Postharvest Handling, Storage, Drying
Burkhardt, Thomas H.		12	0.25	0.00	0.75	Construction Systems & Project Scheduling
Gerrish, John B.		12	0.40	0.00	0.60	Electronics/Odor Control
Guyer, Daniel E.		13	0.25	0.75	0.00	Fruit/Vegetable Storage/Handling
Loudon, Theodore L.		12	0.30	0.70	0.00	Irrigation/Waste Water Treatment
Person, Howard L.		13	0.30	0.70	0.00	Agricultural Structures/Livestock/Waste Treatment
Segerlind, Larry J.		12	0.35	0.00	0.65	Finite Element Analysis/Structures
Steffe, James F.		12	0.35	0.00	0.65	Food Engineering/Rheology
Surbrook, Truman C.		12	0.25	0.00	0.75	Electrical Technology /Stray Voltage
Van Ee, Gary R.		12	0.65	0.00	0.35	Chemical Application/Power & Machinery
von Bernuth, Robert D.		12	0.36	0.26	0.38	Manure Management
Wilkinson, Robert H.		12	0.15	0.60	0.25	Human Factors Engineering/Chemical Application
TOTALS:			5.20	4.56	5.24	

PROJECTS

MICL01245*	Improvement of Thermal Processes for Foods	Steffe, J.
MICL01579	Development of Machine Concepts for Mechanized Agriculture	Lebeduhr, R.
MICL01581	Value-Added Quality Control Techniques in the Postharvest Stages of Fruit and Vegetable Products	Guyer, D.
MICL01591*	Microirrigation: Management Practices to Sustain Water Quality and Agricultural Productivity	von Bernuth, R.
MICL01676*	Technology and Principles for Assessing and Retaining Postharvest Quality of Fruits and Vegetables	Guyer, D.
MICL01695*	Integrated Systems for Improved Water and Nitrogen Management in Irrigation Environments	Loudon, T.
MICL01704	Computational Methods in Food and Agricultural Engineering	Segerlind, L.
MICL01726	Laser Spectroscopy for Analysis of Crystallization Processes	Berglund, K.
MICL01738*	Marketing and Delivery of Quality Cereals and Oilseeds	Bakker-Arkema, F.
MICL01767	Development of Chemical Application Technology for Agribusiness	Van Ee, G.

Agricultural Engineering

(continued)

MICL01777	Engineering for Food Quality and Safety	Brook, R.
MICL01784	Marketing and Delivery of Quality Cereals and Oilseeds	Bakker-Arkema, F.
MICL01787	Improvement of Small-Scale Decentralized and Onsite Wastewater Treatment and Disposal	Loudon, T.
MICL01793	Dimensional Analysis and Scale Modeling in Biosystems Engineering	Srivastava, A.
MICL01794	Analysis and Characterization of Biosystems	Gerrish, J.
MICL01799	Designing Dairy Facilities to Enhance Management and to Meet Animals' Needs	Bickert, W.
MICL01809	Deposition Efficiency of Chemical Application	Wilkinson, R.
MICL01862	Neutral-to-Earth Voltage Reduction on Livestock Farms	Surbrook, T.
MICL03344	Alternative Systems Development for Sustainable Pasture Rearing of Swine in an Intensive Land Use Environment	Person, H.
MICL08180	Rheology and Protein Chemistry of "Undeveloped" Dough	Steffe, J.



Animal Science

Phone: 355-8383

Maynard G. Hogberg,
Chair

FACULTY	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Allen, Michael	13	0.50	0.50	0.00	Forage Nutrition
Aulerich, Richard J.	12	0.75	0.25	0.00	Fur-bearing Animals/Nutrition/Toxicology
Balander, Richard J.	13	0.40	0.00	0.60	Avian Physiology/Reproduction
Banks, Bobby D.	13	0.25	0.00	0.75	Animal Genetics
Bates, Ronald O.	14	0.20	0.80	0.00	Swine Genetics/Management
Beede, David ⁵	12	0.50	0.35	0.15	Dairy Nutrition/Dairy Management
Benson, Margaret	12	0.20	0.50	0.30	Ruminant Nutrition/Sheep
Bucholtz, Herbert F.	12	0.15	0.70	0.15	Dairy Nutrition/Management
Bursian, Steven	12	0.85	0.00	0.15	Avian Physiology/Toxicology
Burton, Jeanne L.	14	0.80	0.00	0.20	Molecular Genetics/Dairy Cattle
Buskirk, Daniel	14	0.50	0.50	0.00	Ruminant Nutrition/Beef
Chou, Karen	13	0.80	0.00	0.20	Toxicology
Coe, Paul H.	13	0.20	0.00	0.80	Animal Health
Coussens, Paul M.	13	0.80	0.00	0.20	Molecular Biology
Doumit, Matthew E.	14	0.25	0.00	0.75	Meat Science/Muscle Biology
Dukelow, W. Richard	12	0.25	0.00	0.75	Reproductive Physiology
Ernst, Catherine W.	14	0.80	0.00	0.20	Meat Animal Genetics
Ferris, Theodore A.	12	0.20	0.80	0.00	Dairy Genetics

Animal Science

(continued)

	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Fogwell, Ralph L.	12	0.30	0.50	0.20	Physiology
Hawkins, David R.	12	0.15	0.00	0.85	Beef Cattle Nutrition/Management
Hill, Gretchen M.	13	0.85	0.00	0.15	Swine Nutrition
Ireland, James J.	12	0.95	0.00	0.05	Physiology
Mao, Ivan Ling	12	0.95	0.00	0.05	Dairy Genetics
Nielsen, Brian D.	14	0.60	0.00	0.40	Equine Exercise Physiology
Orth, Michael	14	0.80	0.00	0.20	Turkey Nutrition/Growth Biology
Osburn, Wesley N.	14	0.25	0.00	0.75	Meat Science
Ritchie, Harlan D.	12	0.10	0.90	0.00	Beef Cattle Nutrition/Management
Rozeboom, Dale	14	0.15	0.70	0.15	Swine Nutrition/Management
Rust, Steven	12	0.50	0.50	0.00	Beef Feedlot Nutrition
Smith, George W.	14	0.75	0.00	0.25	Reproductive Physiology
Tempelman, Robert	14	0.50	0.00	0.50	Statistics
Trottier, Nathalie	14	0.40	0.00	0.60	Swine Nutrition/Management
Tucker, H. Allen	12	0.85	0.00	0.15	Physiology/Lactation
VandeHaar, Michael	13	0.65	0.00	0.35	Dairy Nutrition
Yokoyama, Melvin T.	12	0.85	0.00	0.15	Animal Nutrition/Microbiology
Zanella, Adroaldo	14	0.75	0.00	0.25	Ethology/Stress Physiology
TOTALS:		18.75	7.00	10.25	

PROJECTS

MICL00859	Hormonal Control of Reproduction in Cattle, Sheep and Swine	Dukelow, W.
MICL01039	Fur Animal Studies (Mink)	Aulerich, R.
MICL01156*	Management Systems for Improved Decision Making and Profitability of Dairy Herds	Beede, D.
MICL01163	Factors Controlling Growth and Lactation	Tucker, H.
MICL01178	New Breeding Strategies to Maximize the Efficiency of Dairy Cattle Improvement	Mao, I.
MICL01182*	Molecular Mechanisms Regulating Skeletal Muscle Growth and Differentiation	Doumit, M.
MICL01196*	Methods to Increase Reproductive Efficiency in Cattle	Fogwell, R.
MICL01521*	Metabolic Relationships in Supply of Nutrients for Lactating Cows	VandeHaar, M.
MICL01573	Development of Chimeric Antigens as Vaccines to Regulate Fertility	Ireland, J.
MICL01575*	Increased Efficiency of Sheep Production	Benson, M.
MICL01604	Increasing Efficiency of Protein Production in Dairy Cattle	VandeHaar, M.
MICL01622	Environmental Chemical Influences on Reproduction	Chou, K.
MICL01643	Microbial Ecology of Rumen, Gastrointestinal Tract, Ensiled Feeds, and Livestock	Yokoyama, M.
MICL01652*	Environmental and Economic Impacts of Nutrient Flows in Dairy Forage Systems	Allen, M.
MICL01691*	Genetic Improvement of Cattle Using Molecular Genetic Information	Mao, I.
MICL01725	Maximum Utilization of Michigan Grown Feedstuffs for Growing-Finishing Cattle	Rust, S.
MICL01727	The Fate and Biological Effects of Xenobiotics in Animals	Bursian, S.
MICL01760	Effects of Specific Nutrients on Health and Productivity of Swine	Hill, G.
MICL01800	Optimizing Nutrition and Management of Dry, Peripartum, and Early Lactation Dairy Cows	Beede, D.
MICL01802	Optimizing the Nutritional Utilization of Forages by Dairy Cattle	Allen, M.
MICL01803	Nutritional, Management and Other Applied Studies Using Poultry and Other Avian Species	Balander, R.
MICL01818*	Biophysical Models for Poultry Production Systems	Rahn, A.
MICL01822	Advanced Biometrical Techniques for Genetic Inference in Livestock Populations	Tempelman, R.
MICL01823	Methods to Enhance Decision Making by Dairy Producers and Artificial Insemination of Bull Studs	Ferris, T.

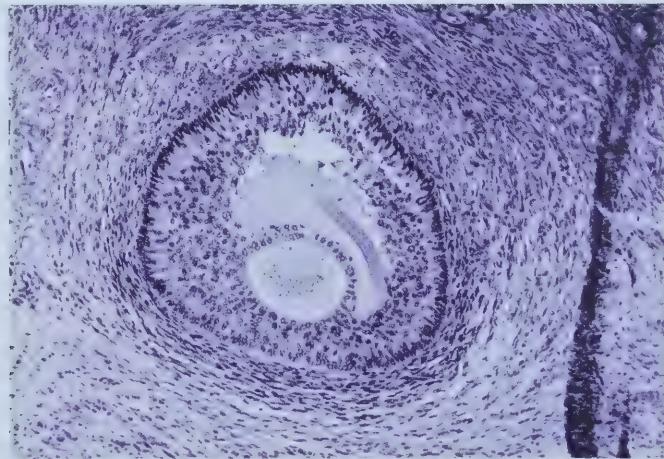
Animal Science

(continued)

MICL01836	Genetic Basis of Parturition-Induced Immunosuppression and Mastitis Susceptibility in Dairy Cows	Burton, J.
MICL01852	Understanding Growth Plate Cartilage Turnover in Meat Producing Birds	Orth, M.
MICL01853	Assessment of Behavioral and Physiological Responses of Animals to Difficult Situations	Zanella, A.
MICL01854	Optimizing Protein and Amino Acid Utilization of Growing Pigs and Gestating and Lactating Sows	Trottier, N.
MICL01861	Management of Athletic Horses to Reduce Musculoskeletal Injuries and Improve Performance	Nielsen, B.
MICL03340	Nutrition and Feeding Management for Michigan Dairy Herds	Bucholtz, H.
MICL03360	Feeding and Management Regimes for Efficient Utilization of Michigan Feedstuffs by Beef Cattle	Buskirk, D.
MICL06872	Energy Balance, Insulin-Like Growth Factor I and Reproductive Health	VandeHaar, M.
MICL06880	Oncogenic Alphaherpesvirus Gene Expression	Coussens, P.
MICL06883	The Use of Propionibacterium for Prevention of Lactic Acidosis	Rust, S.
MICL06888	Does Nitric Oxide Regulate Growth Plate Cartilage Turnover?	Orth, M.
MICL06889	Identification of PCR-RFLPs in Glucocorticoid Receptor Genes of Pedigreed Cattle	Burton, J.
MICL08133	Aminergic Regulation of Growth Hormone Secretion in Cattle	Tucker, H.
MICL08146	Effects of Inhibins and Their Subunits on Gonadal Function in Heifers	Ireland, J.
MICL08168	MDV Replication: Factors Critical to Origin Function	Coussens, P.
MICL08185	Fifth International Symposium on Marek's Disease	Coussens, P.
MICL08186	Aminergic Regulation of Growth Hormone Secretion in Cattle	Tucker, H.

Biochemistry

Phone: 355-1600



William L. Smith, Chair

FACULTY

	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Burton, Zachary F.	13	0.20	0.00	0.80	Molecular Biology
Fraker, Pamela J.	12	0.44	0.00	0.56	Immunology
Gage, Douglas A.	14	0.20	0.00	0.80	Plant Biochemistry
Hausinger, Robert P.	12	0.25	0.00	0.75	Enzymology
Kaguni, Jon M.	12	0.58	0.00	0.42	Molecular Biology
Kindel, Paul K.	12	0.60	0.00	0.40	Plant Biochemistry
Kroos, Lee R.	13	0.56	0.00	0.44	Molecular Biology
McGroarty, Estelle J.	12	0.33	0.00	0.67	Lipid/Protein Biochemistry
Preiss, Jack	12	0.25	0.00	0.75	Starch Biochemistry
Schindler, Melvin S.	12	0.35	0.00	0.65	Cell Biology

Biochemistry

(continued)

	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Trienzenberg, Steven J.	12	0.16	0.00	0.84	Molecular Biology
Wang, John L.	12	0.20	0.00	0.80	Cell Biology
Watson, J. Throck	12	0.50	0.00	0.50	Analytical Biochemistry
TOTALS:		4.62	0.00	8.38	

PROJECTS

MICL01290*	Regulation of Photosynthetic Processes	Preiss, J.
MICL01598	Gene Regulation During Development of Soil Bacteria	Kroos, L.
MICL01601	DNA Replication and Its Regulation in <i>Escherichia coli</i>	Kaguni, J.
MICL01608	Activation of Gene Expression by a Herpes Simplex Virion Protein	Trienzenberg, S.
MICL01610	Transcription Factors That Bind to RNA Polymerase II	Burton, Z.
MICL01614	Interaction of Rhizobium With Soybean Cells	Wang, J.
MICL01668	Isolation and Structure of Plant Cell Wall Pectic Polysaccharides	Kindel, P.
MICL01683	Control of Lipopolysaccharide Synthesis in <i>Pseudomonas</i> Species by Alginate Regulator Genes	McGroarty, E.
MICL01754	Protein Structure Elucidation Using MALDI-Mass Spectrometry	Watson, J.
MICL01781	Mechanism of Aluminum Toxicity—Optical Trap Measurements of Cytoskeletal Dysfunction in Living Cells	Schindler, M.
MICL01816	Biosynthesis of the Plant Osmoprotectant Dimethylsulfoniopropionate (DMSP)	Gage, D.
MICL08162	Branching Enzyme and Starch Synthase Isoforms in Starch Synthesis	Preiss, J.
MICL08179	Genetic Engineering of Amylopullulanses for Agricultural Bioprocessing	Zeikus, J.



Botany and Plant Pathology

Phone: 355-4683



Gustaaf A. de Zoeten,
Chair

FACULTY

	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Adams, Gerard C.	13	0.55	0.27	0.18	Plant Pathology/Mycology
Allison, Richard F.	13	0.75	0.00	0.25	Plant Molecular Virology
Fulbright, Dennis W.	12	0.83	0.00	0.17	Plant Pathology/Plant Pathogen Genetics
Hammerschmidt, Raymond	12	0.83	0.00	0.17	Plant Pathology/Biochemistry/Physiology/Plant Disease Resistance
Hart, L. Patrick	12	0.40	0.50	0.10	Plant Pathology/Field Crops
Hausbeck, Mary K.	14	0.29	0.61	0.10	Plant Pathology/Ornamentals, Vegetables & Greenhouse Crops
He, Sheng-Yang	14	0.25	0.00	0.75	Molecular Biology/Plant-Pathogen Interactions

Botany and Plant Pathology

(continued)

	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Jarosz, Andrew M.	13	0.75	0.00	0.25	Plant Pathology/Pathogen Epidemiology
Jones, Alan L.	12	0.50	0.40	0.10	Plant Pathology/Fruit Tree Crops
Ohlrogge, John B.	12	0.84	0.00	0.16	Plant Physiology/Biochemistry/Molecular Biology/Plant Lipid Synthesis
Poff, Ken	12	0.25	0.00	0.75	Plant Physiology
Prather, L. Alan	14	0.25	0.00	0.75	Plant Systematics
Safir, Gene R.	12	0.90	0.00	0.10	Plant Pathology/Mycorrhizal Fungi
Sang, Tao	14	0.25	0.00	0.75	Plant Systematics & Molecular Evolution
Sears, Barbara B.	12	0.25	0.00	0.75	Molecular Biology & Plant Organelle Genetics
Trail, Frances	14	0.27	0.00	0.73	Host Pathogen Interactions
Vargas, Joseph M., Jr.	12	0.26	0.49	0.25	Plant Pathology/Diseases/Sod & Turf
TOTALS:		8.42	2.27	6.31	

PROJECTS

MICL01206*	Biocontrol of Soilborne Plant Pathogens	Safir, G.
MICL01259*	<i>Fusarium</i> Mycotoxins in Cereal Grains	Hart, L.
MICL01408*	Biological Improvement of Chestnut and Management of the Chestnut Blight Fungus	Fulbright, D.
MICL01499	Control and Utilization of VA Mycorrhizal Root Colonization	Safir, G.
MICL01533	Genetic Engineering of Oilseed Crops	Ohlrogge, J.
MICL01562	Physiology of Resistance and Induced Resistance to Disease in Potato	Hammerschmidt, R.
MICL01662	Avirulent Fungal and Bacterial Plant Pathogens: Their Role and Fate in Plant Disease Epidemics	Fulbright, D.
MICL01673	Biology and Control of Pathogens of Field Crops	Hart, L.
MICL01679	<i>Plastome mutator</i> of Oenothera: A Nuclear Gene That Causes Chloroplast DNA Mutations	Sears, B.
MICL01703	Pathogen Population Biology as a Tool in Developing IPM Strategies	Jarosz, A.
MICL01711	Development and Testing of Molecular Probes for Detection of Pathogens in Symptomless Conifers	Adams, G.
MICL01718	Diseases of Upland Vegetables, Greenhouse Ornamentals, and Vegetable Transplants and Their Control	Hausbeck, M.
MICL01756*	Multidisciplinary Evaluation of New Apple Cultivars	Jones, A.
MICL01808	Recombination Between Viral RNA and Transgenic Plant Transcripts	Allison, R.
MICL01827	Complementation of Movement Function Between Genetic Components of Pea Enation Mosaic Virus	de Zoeten, G.
MICL01832	Management of Turfgrass Diseases	Vargas, J.
MICL01843	Cryptic Plant Pathogenic Fungi: Biology of Latent Pathogens in Symptomless Trees	Adams, G.
MICL03183	Diseases of Tree Fruit Crops and Their Control	Jones, A.
MICL03317	Management of Turfgrass Diseases	Vargas, J.
MICL07618	Control of Bacterial Diseases in Vegetable Transplants in the Greenhouse	Hausbeck, M.
MICL07619	Controlling Fire Blight Disease of Apple Trees	Jones, A.
MICL08140	Control of Thiabendazole Resistant <i>Fusarium sambucinum</i> Causing Dry Rot of Potato	Jarosz, A.
MICL08141	Detection Methods for <i>Erwinia amylovora</i> for Use in Sanitation and Breeding Programs	Jones, A.
MICL08167	Recombination Between Viral RNA and Transgenic Plant Transcripts	Allison, R.
MICL08174	Controls of Chloroplast Inheritance	Sears, B.

Chemical Engineering

Phone: 355-5135

PROJECTS

MICL07602	Bioprocessing for Utilization of Agricultural Raw Materials	Berglund, K.
MICL07621	Bioprocessing for Utilization of Agricultural Raw Materials	Berglund, K.
MICL08136	Catalytic Upgrading of Lactic Acid	Miller, D.
MICL08193	Multiphase Biocatalysis Using Reversible Aphrons	Worden, R.

Chemistry

Phone: 355-9715

PROJECTS

MICL08160	Environmentally Compatible Synthesis of Value-Added Chemicals From D-Glucose	Frost, J.
MICL08172	Charge Separation and Stabilization in Chloroplast Photosystem II	Babcock, G.

Crop and Soil Sciences

Phone: 355-0271



Boyd G. Ellis, Chair

FACULTY

	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Baird, James H.	14	0.70	0.00	0.30	Turfgrass Management
Boyd, Stephen A.	12	0.75	0.00	0.25	Environmental Soil Chemistry
Christenson, Donald R.	12	0.35	0.50	0.15	Fertility/Management
Copeland, Lawrence O.	12	0.15	0.75	0.10	Seed Technology
Crum, James L.	12	0.25	0.00	0.75	Soil Class/Genesis/Turfgrass
Dazzo, Frank B.	12	0.10	0.00	0.90	Microbial Ecology
Diers, Brian W.	14	0.75	0.00	0.25	Soybean Breeding/Genetics
Douches, David S.	13	0.90	0.00	0.10	Potato Breeding/Genetics
Foster, Eunice F.	12	0.15	0.00	0.85	Crop Physiology

Crop and Soil Sciences

(continued)

FACULTY

	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Freed, Russell D.	12	0.50	0.00	0.50	International Agronomy/Plant Breeding
Harwood, Richard R. ²	12	0.60	0.20	0.20	Sustainable Agriculture
Hesterman, Oran B.	12	0.23	0.62	0.15	Alfalfa/Forage Production
Jacobs, Lee W.	12	0.50	0.50	0.00	Environmental Waste Management
Kells, James J., Jr.	12	0.25	0.60	0.15	Weed Science
Kelly, James D.	12	0.75	0.00	0.25	Dry Bean Breeding
Knezek, Bernard D.	12	0.50	0.00	0.50	Micronutrient/Waste Utilization
Leep, Richard H.	12	0.35	0.50	0.15	Soil Fertility/Forage Management
Lenski, Richard E. ³	12	0.40	0.00	0.60	Microbial Ecology & Evolutionary Biology
Mokma, Delbert L.	12	0.50	0.15	0.35	Soil Classification/Genesis
Paul, Eldor A.	12	0.62	0.14	0.24	Soil Microbiology
Penner, Donald	12	0.80	0.00	0.20	Crop/Weed/Physiology
Pierce, Francis J.	12	0.70	0.00	0.30	Soil Management Systems
Renner, Karen A.	12	0.50	0.50	0.00	Weed Science
Rieke, Paul E.	12	0.35	0.50	0.15	Turfgrass Management
Ritchie, Joe T. ⁴	12	0.00	0.50	0.00	Soil Physics/Plant Stress
Robertson, G. Philip	12	0.38	0.00	0.62	Ecosystem Ecology
Rogers, John N. III.	13	0.25	0.00	0.75	Turfgrass Management
Schabenberger, Oliver	14	0.40	0.00	0.60	Statistician
Smucker, A.J.M.	12	0.75	0.00	0.25	Soil Biophysics
Thomashow, Michael F.	12	0.76	0.00	0.24	Plant & Microbial Molecular Genetics
Tiedje, James M.	12	0.60	0.00	0.40	Soil Microbiology/Microbial Ecology
Vitosh, Maurice L.	12	0.30	0.70	0.00	Soil Fertilization Management
Ward, Richard W.	13	0.75	0.00	0.25	Wheat Breeding
Warncke, Darryl D.	12	0.50	0.50	0.00	Greenhouse/Vegetable Soil Fertility
TOTALS:		16.34	6.66	10.50	

PROJECTS

MICL00319	Classification, Genesis and Evaluation of Michigan Soils	Mokma, D.
MICL00569	Breeding and Testing Small Grain Cultivars for Michigan	Freed, R.
MICL00908	Fundamental Factors in Cultural and Chemical Weed Control, Weed Competition, and Weed Life Cycles	Renner, K.
MICL01103	Adsorption, Transformation and Release of Inorganic Nutrients by Soils	Ellis, B.
MICL01124	Efficient Use of Plant Nutrients	Vitosh, M.
MICL01462*	Impact of Accelerated Erosion on Soil Properties and Productivity	Mokma, D.
MICL01471*	Chemistry and Bioavailability of Waste Constituents in Soils	Jacobs, L.
MICL01538	Harvestability and Processing Quality of Sugar Beet Roots	Saunders, J.
MICL01561*	Forage Protein Characterization and Utilization for Cattle	Hesterman, O.
MICL01568	Plant Biotechnology: Molecular Approaches to Improve Environmental Stress Tolerance	Thomashow, M.
MICL01574	Movement and Degradation of Organic Contaminants in Soils	Boyd, S.
MICL01617*	Biological and Ecological Basis for Weed Management Decision Support Systems to Reduce Herbicide Use	Kells, J.
MICL01654	Genetic Improvement of Beans (<i>Phaseolus vulgaris</i> L.) for Yield, Pest Resistance and Food Value	Kelly, J.
MICL01685	Crop Rotation Effects on Soil Microbial Activity, Nutrient Use Efficiency and Productivity	Harwood, R.
MICL01714	Enhancing Profitability and Sustainability of Crop Production Systems for Farmers	Hesterman, O.

Crop and Soil Sciences

(continued)

PROJECTS

MICL01717	Soybean Breeding and Genetics	Diers, B.
MICL01761	Weed Management as a Component of Field Crop Production Systems	Kells, J.
MICL01768	Management and Production of Grasses, Legumes, and Their Mixtures for Sustainable Forage Crops and Pasture	Moline, W.
MICL01772*	Characterizing Nitrogen Mineralization and Availability in Crop Systems to Protect Water Resources	Vitosh, M.
MICL01779	The Physiology and Biochemistry of Herbicide Action, Selectivity, and Degradation	Penner, D.
MICL01780	Impact Absorption, Traction and Wear Tolerance Investigation on Turf and Soil Surfaces	Rogers, J.
MICL01782	Application of Organic and Other Waste Residuals to Agricultural Soils as a Waste Management Option	Jacobs, L.
MICL01796	Soil and Site-Specific Management for Conservation in Agricultural Systems	Pierce, F.
MICL01797	Soil Microbiology and Biochemistry in Agroecosystems	Paul, E.
MICL01798	Rates and Mechanisms of Sorption Processes in Soils	Anderson, S.
MICL01806	Breeding and Genetics for the Improvement of Potato (<i>Solanum tuberosum</i> L.)	Douches, D.
MICL01807	Properties of High Sand Content Soils for Turfgrass Uses	Crum, J.
MICL01821	Microbial Ecology of Soil and Biodegradation	Tiedje, J.
MICL01830	Wheat Breeding and Genetics	Ward, R.
MICL01837	Cultivation and Topdressing Effects on Turf and Soil	Rieke, P.
MICL01855	The Role of Mutation in Bacterial Evolution	Lenski, R.
MICL01858	Systems of Cropping	Christenson, D.
MICL03122	Development and Correlation of Soil Test Procedures With Crop Yields and Plant Nutrient Contents	Warncke, D.
MICL03128	Systems of Cropping	Christenson, D.
MICL03260	Forage Management Studies in Northern Michigan	Leep, R.
MICL03302	Management of Organic Soils for Crop Production	Warncke, D.
MICL03313	Cultivation and Topdressing Effects on Turf and Soil	Rieke, P.
MICL03319	Wheat Breeding and Genetics	Ward, R.
MICL03324	Drought Resistance in Common Bean	Foster, E.
MICL03335	Soil Biophysical Mechanisms of Functional Plant Roots in Crops of Agroecosystems	Smucker, A.
MICL03336	Maize Breeding and Production Management	Harpstead, D.
MICL03359	Variety Release: Canola and Wheat Management	Copeland, L.
MICL07603	Management Systems for Sustainably Integrating Soil, Plants and Animals	Harwood, R.
MICL07611	Improved Production and Utilization Technology for Michigan Potatoes	Douches, D.
MICL07620	Sustainable Agriculture: Management Systems for Integrating Soil, Plants and Animals	Harwood, R.
MICL07624	Improved Production and Utilization Technology Through Variety Development	Douches, D.
MICL08142	Organic N Mineralization and Functional Group Abundance in Clover-Amended Soil	Anderson, S.
MICL08143	Factors Governing the Availability of Pesticides for Biodegradation: Sorption and Aging	Boyd, S.
MICL08173	Evaluation of Sustainability of the Novel Shoot Meristem Transformation System in NC Cereal Crops	Sticklen, M.
MICL08176	Role of CBP1 in Cold- and Drought-Regulated Gene Expression	Thomashow, M.
MICL08194	Root and Soil Carbon Contributions to the Stability and Function of Soil Aggregates	Smucker, A.



Entomology

Phone: 355-4662



Edward J. Graefius,
Chair

FACULTY

	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Ayers, George S.	12	0.25	0.00	0.75	IPM/Apiculture
Bird, George W.	12	0.20	0.65	0.15	Agricultural Nematology
Bristow, Catherine	13	0.30	0.00	0.70	Insect Ecology
Dong, Ke	14	0.25	0.00	0.75	Insect Toxicology
Edens, Thomas C.	12	0.20	0.00	0.80	Resource Economics & Policy
Gage, Stuart H.	12	0.48	0.12	0.40	Environmental Systems/Entomological Surveys
G t, Larry	14	0.25	0.65	0.10	Tree Fruit Insects
Landis, Douglas A.	13	0.66	0.14	0.20	Insect Ecology, Biological Control
McCullough, Deborah G.	14	0.30	0.50	0.20	Forest Entomology
Melakerberhan, Haddish	14	0.20	0.00	0.80	Plant-Nematode Interaction Physiology
Merritt, Richard W.	12	0.50	0.00	0.50	Aquatic Insect Ecology
Miller, James R.	12	0.24	0.00	0.76	Insect Behavior
Raikhel, Alexander S.	12	0.30	0.00	0.70	Insect Physiology
Scriber, J. Mark	12	0.25	0.25	0.50	Insect Ecology
Smitley, David R.	13	0.25	0.60	0.15	Landscape/Ornamental Insect Ecology
Stehr, Frederick W.	12	0.37	0.00	0.63	Insect Biocontrol Systems
Thiem, Suzanne	13	0.40	0.00	0.60	Insect Molecular Biology
Walker, Edward D.	13	0.33	0.33	0.34	Medical/Veterinary Entomology
Zabik, Matthew J.	12	0.10	0.00	0.90	Environmental Toxicology
TOTALS:		5.83	3.24	9.93	

PROJECTS

MICL01067*	Climate and Agricultural Landscape Productivity Analysis and Assessment in the North Central Region	Gage, S.
MICL01563*	Spatial Dynamics of Leafhopper Pests and Their Management on Alfalfa	Whalon, M.
MICL01584*	Biological and Cultural Management of Plant-Parasitic Nematodes	Bird, G.
MICL01606	Biological Control and Integrated Management of Insects in Nurseries, Turf and the Urban Forest	Smitley, D.
MICL01640*	Ecology and Management of European Corn Borer and Other Stalk-Boring Lepidoptera	Landis, D.
MICL01644	Plant Chemical Defenses: Insect Detoxification and Ecological Factors Affecting Gene Flow and Host Selection/Hybrid Zone	Scriber, J.
MICL01663	Biology and Management of Insect Pests of Vegetable Crops	Graefius, E.
MICL01698	Development of Arthropod Resistance Management Systems	Whalon, M.
MICL01700	Influence of Gypsy Moth Defoliation on Native Forest Arthropods	McCullough, D.

Entomology

(continued)

PROJECTS

MICL01710	Ecological Impacts and Management of Forest Insects in Michigan	McCullough, D.
MICL01722*	Ecology and Impact of Gypsy Moth Invasion	Scriber, J.
MICL01733	Mechanisms of Baculovirus Pathogenesis in Insects	Thiem, S.
MICL01734	Diet Choice and Foraging in Ants	Bristow, C.
MICL01741*	Overwinter Survival of <i>Heterodera</i> , <i>Pratylenchus</i> , and Associated Nematodes in the North Central Region	Bird, G.
MICL01742	Molecular Basis of Insect Reproduction	Raikhel, A.
MICL01745	The Center for the Study of Insect Diversity	Stehr, F.
MICL01783	Influence of Agricultural Landscape Structure on Biological Control of Pests by Insects	Landis, D.
MICL01792	Physiological Basis for Integrated Approach Towards Sustainable Management of Plant-Parasitic Nematodes	Melakeberhan, H.
MICL01813*	Genetic Variability in the Cyst and Root-Knot Nematodes	Melakeberhan, H.
MICL01814	Factors Regulating Insect Host-Plant Colonization	Miller, J.
MICL01826	Development of Bee Forage Systems	Ayers, G.
MICL03338	Ecology and Management of Arthropod Vector Populations and Vector-Borne Diseases	Walker, E.
MICL03361	Biology and Control of Biting Flies in Michigan	Merritt, R.
MICL08158	Trichogramma Not-Target Impacts: A Model for Biological Control Risk Assessment	Landis, D.
MICL08192	Influence of Perennial Habitats Including High-Value Woody Species on Natural Enemies of Crop Pests	Landis, D.

Family and Child Ecology

Phone: 355-7680



Marjorie J. Kostelnik,
Chair

FACULTY

	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Imig, David R.	12	0.25	0.00	0.75	Family Ecology
Keefe, Dennis R.	14	0.50	0.00	0.50	Family Economics
Keith, Joanne G.	12	0.10	0.80	0.10	Human Development/Family
Schiamborg, Lawrence R.	12	0.30	0.00	0.70	Human Development/Family
Walker, Rosemary A.	12	0.50	0.00	0.50	Family Economics
TOTALS:		1.65	0.80	2.55	

PROJECTS

MICL01523*	Family Business: Interaction in Work and Family Spheres	Walker, R.
MICL01590*	Housing Transitions of the Maturing Population: Consequences for Rural/Nonmetropolitan Communities	Schiamborg, L.
MICL01705	Retirement Transitions of the Maturing Population and Consequences for Rural/Urban Communities	Schiamborg, L.
MICL01786	Determinants of Small Family Business Outcomes	Walker, R.
MICL01841	Identification and Evaluation of Internal and External Assets in the Lives of Children and Adolescents	Keith, J.
MICL03334	Family-Environment Transactions: Effects on Economic Well-Being and Michigan Families' Life Quality	Keefe, D.
MICL03349	Types of Family Structure as Related to Michigan Farm-Family-Business Management Practices	Imig, D.



Fisheries and Wildlife

Phone: 355-4477



William W. Taylor,
Chair

FACULTY					
	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Bence, James R. ⁶	14	0.75	0.20	0.05	Fish Population Dynamics
Bremigan, Mary T. ⁶	14	0.60	0.00	0.40	Fish Management
Campa, Henry III	13	0.50	0.00	0.50	Wildlife Habitat Ecology
Coon, Thomas G.	13	0.20	0.00	0.80	Fish Ecology/Stream Management
Garling, Donald L.	12	0.30	0.50	0.20	Aquaculture
Hayes, Daniel B. ⁶	14	0.75	0.20	0.05	Stream Fisheries Biology
Jones, Michael L. ⁶	13	0.75	0.20	0.05	Fisheries Stream Models
Li, Weiming ⁶	14	0.75	0.20	0.05	Fish Physiology
Liu, Jianguo ⁶	14	0.75	0.20	0.05	Wildlife Systems Models
McNabb, Clarence D.	12	0.74	0.00	0.26	Limnology
Peyton, R. Benny	12	0.42	0.00	0.58	Human Dimensions
Prince, Harold H.	12	0.75	0.00	0.25	Waterfowl/Wetlands
Soranno, Patricia A.	14	0.50	0.00	0.50	Limnology
Winterstein, Scott R.	13	0.50	0.00	0.50	Wildlife Biometry
TOTALS:		8.26	1.50	4.24	
<i>Adjustment for PERM Positions</i>		<i>-4.35</i>	<i>-1.00</i>	<i>-0.65</i>	
ADJUSTED TOTALS		3.91	0.50	3.59	

PROJECTS		
MICL01531	Modeling Wildlife Population Dynamics	Winterstein, S.
MICL01540	Ecology, Population Dynamics and Management of Michigan Great Lakes Fisheries Resources	Taylor, W.
MICL01646	Wildlife Responses to Habitat Management	Campa, H.
MICL01707	Habitat and Its Effects on the Ecology and Management of Fishes	Coon, T.
MICL01716	Environmental and Genetic Components of Reproduction in Bird Populations	Prince, H.
MICL01719	Management of Forests and Wildlife for Multiple Use Benefits	Campa, H.
MICL01739	Improving Public Involvement in Agricultural and Natural Resource Issues	Peyton, R.
MICL01740	Development of Commercial Fish Culture Techniques	Garling, D.
MICL01758	Relationship Between Habitat Characteristics and Fish Population Dynamics	Hayes, D.
MICL01759	Tools and Information for Holistic Management of Great Lakes' Fisheries	Bence, J.
MICL01785	Systems Modeling of Wildlife Dynamics Across Heterogeneous Landscapes	Liu, J.
MICL10006	Regional Aquaculture Center	Batterson, T.
MICL10007	Regional Aquaculture Center	Batterson, T.
MICL10008	Regional Aquaculture Center	Batterson, T.
MICL10009	Regional Aquaculture Center	Batterson, T.

Food Science and Human Nutrition

Phone: 355-8474



Mark A. Uebersax,
Chair

FACULTY	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Bennink, Maurice R.	12	0.50	0.00	0.50	Nutritional Biochemistry
Bond, Jenny T.	12	0.40	0.00	0.60	Prenatal/Postnatal Nutrition
Booren, Alden M.	12	0.15	0.75	0.10	Meat/Poultry/Fish
Bourquin, Leslie D.	14	0.25	0.75	0.00	Food Safety
Cash, Jerry N.	12	0.25	0.75	0.00	Fruit/Vegetable Products
Chenoweth, Wanda L.	12	0.25	0.00	0.75	Clinical Nutrition
Doumit, Matthew E.	14	0.25	0.00	0.75	Meat Quality
Hoerr, Sharon M.	13	0.25	0.00	0.75	Community Nutrition
Linz, John E.	12	0.50	0.00	0.50	Food Microbiology
Ng, Perry K. W.	14	0.50	0.00	0.50	Cereal Science
Ofoli, Robert Y.	13	0.49	0.00	0.51	Colloid/Interface Science
Osburn, Wesley N.	14	0.15	0.00	0.85	Meat/Poultry Production
Pestka, James J.	12	0.62	0.00	0.38	Food Microbiology
Price, James F.	12	0.54	0.00	0.46	Meat/Poultry Products
Romsos, Dale R.	12	0.70	0.00	0.30	Lipid Metabolism
Sawyer, Carol A.	13	0.25	0.00	0.75	Food Service Management
Schemmel, Rachelle A.	12	0.30	0.00	0.70	Clinical Nutrition
Schroeder, Joseph J.	14	0.50	0.00	0.50	Nutritional Biochemistry; Bioactive Lipids
Smith, Denise M.	12	0.67	0.00	0.33	Poultry/Egg Products
Song, Won O.	12	0.25	0.00	0.75	Nutritional Assessment
Steffe, James F.	12	0.25	0.00	0.75	Food Engineering/Rheology
Strasburg, Gale M.	13	0.65	0.00	0.35	Muscle Biochemistry
Ustunol, Zeynep	13	0.50	0.00	0.50	Dairy Foods
Zabik, Mary E.	12	0.19	0.00	0.81	Foods
Zile, Maija H.	12	0.50	0.00	0.50	Nutrition
TOTALS:		9.86	2.25	12.89	

PROJECTS

MICL01193	Factors Affecting Absorption and Utilization of Nutrients	Chenoweth, W.
MICL01209	Quality and Safety of Fresh and Processed Meat Products	Price, J.
MICL01211	Dietary Fat/Carbohydrate Relationships to Selected Health Parameters	Schemmel, R.
MICL01323	Improving Process Efficiency, Product Quality and Nutrient Composition of Fruit and Vegetable Products	Uebersax, M.
MICL01413	Metabolism and Function of Vitamin A	Zile, M.
MICL01419	Processing Treatments Influencing Functional Properties and Utilization of Muscle Foods	Booren, A.
MICL01444*	Role of N-3/N-6 Polyunsaturated Fatty Acids in Health Maintenance	Romsos, D.
MICL01448	Microbial Food Borne Disease	Pestka, J.
MICL01478*	Genetic Improvement of Beans (<i>Phaseolus vulgaris</i> L.) for Yield, Pest Resistance and Food Value	Uebersax, M.
MICL01506*	Development of New Processes and Technologies for the Processing of Poultry Products	Smith, D.
MICL01532*	Functional Properties of Food Proteins	Smith, D.
MICL01599	Regulation of Calcium in Muscle Sarcoplasm	Strasburg, G.
MICL01623	Comparative Aspects of Nutrition and Lipid Metabolism	Romsos, D.
MICL01632	Improving the Quality and Safety of Value-Added Meat and Poultry Products	Smith, D.
MICL01664	Development, Quality and Safety of Value-Added Dairy and Dairy-Based Products	Ustunol, Z.

Food Science and Human Nutrition

(continued)

PROJECTS

MICL01665	Nutritional Assessment in Population-Based Epidemiological Studies	Song, W.
MICL01694*	Nutrient Bioavailability: A Key to Human Nutrition	Chenoweth, W.
MICL01699	Molecular Structure of Soft Wheat Proteins in Relation to End-Use Quality	Ng, P.
MICL01706	Interactions and Surface Phenomena of Colloids and Biopolymers	Ofoli, R.
MICL01715*	Improving Food Safety Through Discovery and Control of Natural and Induced Toxicants and Antitoxicants	Pestka, J.
MICL01724	Functionality of Ingredients in Baked Products and Food Safety Issues for Michigan Consumers	Zabik, M.
MICL01762	Relationship of Diet and Cancer	Bennink, M.
MICL01764	Quality and Safety of Processed Foods	Gray, J.
MICL01791	Processing and Quality Evaluation of Fruits and Vegetables	Cash, J.
MICL01795	Modulation of Colon and Breast Cancer Cell Growth by Sphingolipids	Schroeder, J.
MICL01804*	Using Stages of Change Model to Promote Consumption of Grains, Vegetables and Fruits by Young Adults	Hoerr, S.
MICL01856	Aflatoxin B ₁ Biosynthesis in <i>Aspergillus</i>	Linz, J.
MICL03345	Targeting Michigan Groups at Nutritional/Health Risk	Bond, J.
MICL03351	Empower Foodservice Workers in Michigan to Handle Food Safely	Sawyer, C.
MICL03363	Food Industry Institute	Hegarty, P.
MICL06885	Apoptosis and Sphingolipids in Fumonisin-Induced Kidney Cell Death	Schroeder, J.
MICL08128	Characterization of Soft Wheat Proteins in Relation to Cookie-Making Quality	Ng, P.
MICL08144	Effects of Lactic Cultures on Gastrointestinal Immune Function	Pestka, J.
MICL08151	Recombinant Antibodies for Natural Toxicants	Pestka, J.
MICL08156	Metabolism and Function of Retinoic Acid in Quail Embryogenesis	Zile, M.
MICL08181	ELISA to Determine Adequacy of Cooking to USDA Beef Time/Temperature Schedules	Smith, D.
MICL08191	Metabolism and Function of Retinoic Acid in Quail Embryogenesis	Zile, M.
MICL08195	Biochemical Characterization of Pale, Soft, Exudative Turkey	Strasburg, G.

Forestry

Phone: 355-0091



Daniel E. Keathley, Chair

FACULTY

	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Dickmann, Donald I.	12	0.70	0.00	0.30	Fire Ecology
Epperson, Bryan K.	13	0.70	0.00	0.30	Forest Genetics
Fried, Jeremy S.	14	0.60	0.00	0.40	Forest Management
Hart, James B., Jr.	13	0.50	0.00	0.50	Forest Soils
Kamdem, Donatiens-Pascal	14	0.70	0.00	0.30	Wood Science
Kielbasa, Julian J.	12	0.15	0.25	0.60	Urban Forestry
Kobe, Richard K.	14	0.70	0.00	0.30	Forest Ecology
Lantagne, Douglas O.	13	0.20	0.80	0.00	Silviculture
Leefers, Larry A.	13	0.50	0.00	0.50	Forest Economics
McDonough, Maureen H.	12	0.15	0.50	0.35	Forest Sociology
Potter-Witter, Karen L.	13	0.55	0.35	0.10	Forest Economics
Ramm, Carl W.	13	0.60	0.00	0.40	Forest Biometrics
Stevens, James A.	14	0.50	0.30	0.20	Trade Economics
TOTALS:		6.55	2.20	4.25	

Forestry

(continued)

PROJECTS

MICL01148	Evaluation of Natural Control for Gypsy Moth in Southern Michigan	Ramm, C.
MICL01432	Attitudes Toward Natural Resources and the Environment in the 1990s: A Representative Approach	McDonough, M.
MICL01693*	The National Atmospheric Deposition Program (NADP)	Lantagne, D.
MICL01748	Economic Evaluation of Forest Management Opportunities: Supply/Demand Modeling of Michigan Stumpage Markets	Potter-Witter, K.
MICL01749	Assessment of Effects of Prescribed Burning on Fine Roots in a Mature Red Pine Stand	Dickmann, D.
MICL01750	Production and Trade Flow of Michigan Forest Products	Stevens, J.
MICL01755	Incorporating GIS into Bio-Social Analysis for Ecosystem Management	Fried, J.
MICL01773	Testing Lake States TWIGS: Five and Ten Year Growth Projections for Upland Hardwoods	Ramm, C.
MICL01774	Managing the Genetic Diversity of Michigan Pines	Epperson, B.
MICL01805	Bioremediation of Condensate Produced During Conditioning of Veneer Logs	Kamdem, D.
MICL01811	Incorporating Risk, Natural Resources Accounting and Hedonic Valuation in Forestry Decisions	Leefers, L.
MICL01812	Municipal Tree Management	Kielbaso, J.
MICL01845	Long-Term Diameter, Basal Area and Ordered Categorical Responses of Oak and Hardwood Forests	Hart, J.
MICL03331	Soil and Hydrology Relationships of Forested Landscape Ecosystems	Hart, J.
MICL07607	Advanced Technology Application to Eastern Hardwood Utilization	Suchsland, O.
MICL07609	Advanced Technology Application to Eastern Hardwood Utilization	Suchsland, O.
MICL07615	Advanced Technology Applications to Eastern Hardwood Utilization	Kamdem, D.
MICL07623	Advanced Technology Applications to Eastern Hardwood Utilization	Kamdem, D.



Horticulture

Phone: 355-5191

Wayne H. Loescher,
Chair

FACULTY

	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Beaudry, Randolph M.	13	0.50	0.50	0.00	Postharvest Fruit Physiology
Behe, Bridget K.	14	0.25	0.00	0.75	Horticulture Marketing
Biernbaum, John A.	13	0.20	0.00	0.80	Plant Physiology/Floriculture
Cameron, Arthur C.	12	0.70	0.00	0.30	Plant Physiology/Landscape Horticulture
Carlson, William H.	12	0.35	0.50	0.15	Floriculture/Physiology & Bedding
Dilley, David R.	12	0.80	0.00	0.20	Postharvest Physiology/Pomology
Ewart, Lowell C.	12	0.60	0.00	0.40	Floral/Onion Breeding
Flore, James A.	12	0.65	0.00	0.35	Plant Physiology/Pomology

	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Grumet, Rebecca	13	0.90	0.00	0.10	Vegetable Breeding/Genetics
Hancock, James F.	12	0.90	0.00	0.10	Small Fruit Breeding/Genetics
Hanson, Eric J.	13	0.35	0.65	0.00	Pomology Small Fruits
Heins, Royal D.	12	0.75	0.00	0.25	Plant Physiology/Floriculture
Herner, Robert C.	12	0.35	0.00	0.65	Postharvest Physiology/Vegetable Crops
Howell, Gordon S.	12	0.80	0.00	0.20	Plant Physiology/Viticulture/Enology
Iezzoni, Amy F.	12	0.80	0.00	0.20	Fruit Breeding/Genetics
Kelly, John F.	12	0.66	0.11	0.23	Vegetable Composition
Lownds, Norman K.	14	0.25	0.00	0.75	Landscape Horticulture/Stress Physiology
Nair, Muraleedharan G.	13	0.90	0.00	0.10	Natural Products/Chemistry
Perry, Ronald L.	12	0.50	0.50	0.00	Pomology/Rootstocks
Rowe, D. Bradley	14	0.25	0.00	0.75	Landscape Horticulture
Schutzki, Robert E.	13	0.10	0.00	0.90	Landscape Horticulture
Sink, Kenneth C.	12	0.75	0.00	0.25	Genetics/Plant Breeding
Widders, Irvin E.	12	0.67	0.00	0.33	Vegetable Physiology
Zabadal, Thomas J.	13	0.50	0.50	0.00	Viticulture
Zandstra, Bernard H.	12	0.25	0.75	0.00	Vegetable Crops
TOTALS:		13.73	3.51	7.76	

PROJECTS

MICL01155*	Postharvest Physiology of Fruits	Dilley, D.
MICL01222*	Plant Germ Plasm and Information Management and Utilization	Iezzoni, A.
MICL01272	Physiology of Carbon Balance in Fruit Crops: Abiotic and Biotic Thresholds	Flore, J.
MICL01305*	Rootstock and Interstem Effects on Pome and Stone Fruit Trees	Perry, R.
MICL01325	Weed Control in Vegetable Crop Management Systems	Zandstra, B.
MICL01428	Sour Cherry and Peach Breeding and Genetics	Iezzoni, A.
MICL01461*	Freeze Damage and Protection of Fruit and Nut Crops	Howell, G.
MICL01468	Role of Ion Flux and Compartmentation in the Transduction of Environmentally Elicited Signals	Widders, I.
MICL01517	Optimization of the Root Zone Environment in Greenhouse Crop Production	Biernbaum, J.
MICL01607	Physiological Adaptation and Cultural Manipulation of Plant Systems	Schutzki, R.
MICL01680	Biologically Active Natural Products and Value-Added Products From Plants and Microbes for Agricultural and Pharmaceutical Use	Nair, M.
MICL01684	Modified Atmosphere Packaging of Horticultural Produce	Cameron, A.
MICL01697*	Controlled Environment and Facilities Engineering for Greenhouses	Heins, R.
MICL01731	Breeding and Genetic Studies for Selected Horticultural Crops	Sink, K.
MICL01743	Chemical Regulation of Plant Growth, Quality and Yield	Ries, S.
MICL01753	Application of Molecular Genetic Approaches to Vegetable Crop Improvement	Grumet, R.
MICL01778	Environmental and Physiological Variables Effect on Growth, Quality and Marketability of Garden Crops	Carlson, W.
MICL01810	Genetic Improvement of Strawberries and Blueberries	Hancock, J.
MICL01824	Physiological and Environmental Factors Influencing Growth and Development of Flower Crops	Heins, R.
MICL01839	Efficient Use of Fertilizers in Fruit Production	Hanson, E.
MICL01846	Tomato Ripening Mutants	Herner, R.
MICL03218	Vine Culture and Physiology for Best Yield, Fruit Quality and Adaptation to Environmental Stresses	Howell, G.
MICL03266	Breeding and Genetics of Onions	Ewart, L.

Horticulture (continued)

PROJECTS

MICL03272	Physiological and Environmental Factors Influencing Growth and Development of Flower Crops	Heins, R.
MICL03281	Efficient Use of Fertilizer in Fruit Production	Hanson, E.
MICL03305	Viticultural Practices for Mechanical Pruning and Crop Control of Concord and Niagara Grapevines	Zabadal, T.
MICL03310	Preserving Postharvest Quality of Fruits and Vegetables	Beaudry, R.
MICL07583	Factors Causing Decline of Stone Fruit Trees With Emphasis on Sweet Cherry Under Michigan Conditions	Flore, J.
MICL07606	Safeguarding the Supply of Specialty Crops for Consumers	Flore, J.
MICL07622	Safeguarding the Supply of Specialty Crops for Consumers	Flore, J.
MICL08125	Effect of Salinity Stress on Regulation of Mannitol Metabolism	Loescher, W.
MICL08187	CO ₂ Role in Reaction Mechanism of ACC Oxidase in Ethylene Biosynthesis	Dilley, D.

Human Environment and Design

Phone: 355-7712



Dana G. Stewart, Chair

FACULTY

	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Pysarchik, Dawn I.	13	0.31	0.00	0.69	Mercantile Management
Slocum, Ann C.	13	0.25	0.00	0.75	Apparel Design & Textiles
Sontag, M. Suzanne	12	0.25	0.00	0.75	Apparel Design & Textiles
Sternquist, Brenda J.	12	0.25	0.00	0.75	Mercantile Management
TOTALS:		1.06	0.00	2.94	

PROJECTS

MICL01442*	Occupational Safety and Health Through the Use of Protective Clothing	Slocum, A.
MICL01775	Processed Foods in India: Consumer Demand and Distribution Systems	Pysarchik, D.
MICL01833	Emerging Free Markets: The Role of Federal vs. Municipal Approved Retail Joint Ventures	Sternquist, B.
MICL03357	Needs of the Michigan Textile/Apparel Industry: Characterization, Assessment and Response Strategies	Sontag, M.

Kellogg Biological Station

Phone: 353-9445



Michael J. Klug, Director

FACULTY

	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Bush, Guy L.	12	0.10	0.00	0.90	Genetics
TOTALS:		0.10	0.00	0.90	

PROJECTS

MICL08188	Closing Global Nitrous Oxide Cycle: Mechanistic Understanding Flux Partitioning Agricultural Landscapes	Robertson, G.
-----------	---	---------------



Large Animal Clinical Sciences

Phone: 355-9593



Frederik J. Derksen,
Chair

FACULTY

	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Baker, John C.	12	0.20	0.00	0.80	Bovine Respiratory Diseases
Erskine, Ronald J.	13	0.25	0.33	0.42	Dairy Cattle Mastitis
Gomez-Duran, Charles O.	14	0.50	0.30	0.20	Swine Veterinary Medicine
Grooms, Daniel L.	14	0.50	0.50	0.00	Beef Disease Management
Herdt, Thomas H.	12	0.25	0.00	0.75	Cattle Nutrition & Metabolic Diseases
Holland, Robert E.	13	0.34	0.00	0.66	Bovine Enteric Disease
Kaneene, John B.	12	0.14	0.00	0.86	Epidemiology/Disease Impact
Robinson, Norman E.	12	0.25	0.00	0.75	Respiratory Physiology
Rook, Joseph S.	13	0.40	0.40	0.20	Small Ruminant Animals
Sears, Phillip	12	0.35	0.35	0.30	Dairy Disease Management
Straw, Barbara	12	0.28	0.50	0.22	Swine Veterinary Medicine
TOTALS:		3.46	2.38	5.16	

PROJECTS

MICL01417*	Bovine Respiratory Disease: Risk Factors, Pathogens, Diagnosis and Management	Baker, J.
MICL01550	Bovine Respiratory Disease: Risk Factors, Immunology, Pathogenesis and Control	Baker, J.
MICL01688*	Mastitis Resistance to Enhance Dairy Food Safety	Erskine, R.
MICL01708	Pre-Harvest Food Safety in Dairy Cattle: Reducing Risks Related to Mastitis	Erskine, R.
MICL01801	Total Quality Management for Disease Control on Swine Farms	Straw, B.
MICL01819	Nutritional Assessment of Animals and Animal Populations by Laboratory Means	Herdt, T.
MICL01820	Assessment and Control of Enteric Pathogens Among Neonatal Calves	Holland, R.
MICL03354	Implementing Food Safety Through Total Quality Management on Michigan Dairy Farms	Sears, P.
MICL03355	Perinatal Lamb Mortality and Production Issues Associated With Pasture Lambing Systems in Michigan	Rook, J.
MICL06878	Persistent Infection With Bovine Viral Diarrhea Virus (BVDV): Diagnosis, Epidemiology and Control	Baker, J.
MICL06879	Is the Dairy Quality Assurance Program Effective in Reducing Drug Residues in Milk?	Kaneene, J.
MICL06881	Testing of a New Tool to Quantitate Cytokine Gene Expression in Swine	Mansfield, L.
MICL06886	Mucus Secretion in Horse Airways	Robinson, N.
MICL06887	Characterization of a Novel Equine Cartilage Matrix Metalloprotease	Caron, J.
MICL07581	Minor Use Animal Drug Program: North Central Region	Holland, R.
MICL07610	Minor Use Animal Drug Program: North Central Region	Holland, R.

Mechanical Engineering

Phone: 351-5131

PROJECTS

Mechanical Engineering

MICL08148 Flame Spread Over Wood Fiber and Thermoplastic Composites

Wichman, I.

Microbiology

Phone: 355-6463



Jerry B. Dodgson, Chair

FACULTY

	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Bagdasarian, Michael	12	0.39	0.00	0.61	Molecular Biology
Breznak, John A.	12	0.30	0.00	0.70	Microbial Ecology
Champness, Wendy C.	13	0.50	0.00	0.50	Microbial Genetics
Dazzo, Frank B.	12	0.80	0.00	0.20	Microbial Ecology
de Bruijn, Frans J.	12	0.38	0.00	0.62	Molecular Biology
Hausinger, Robert P.	12	0.40	0.00	0.60	Microbial Physiology
Klug, Michael J.	12	0.25	0.00	0.75	Microbial Ecology
Maes, Roger K.	12	0.03	0.00	0.97	Virology
Reddy, C. Adinarayana	12	0.46	0.00	0.54	Microbial Physiology/Ecology
Schmidt, Thomas M.	14	0.40	0.00	0.60	Microbial Ecology
Thomashow, Michael F.	12	0.14	0.00	0.86	Plant & Microbial Molecular Genetics
Tiedje, James M.	12	0.15	0.00	0.85	Soil Microbiology
Velicer, Leland F.	12	0.30	0.00	0.70	Virology
TOTALS:		4.50	0.00	8.50	

PROJECTS

MICL01154*	Enteric Diseases of Swine and Cattle: Prevention, Control and Food Safety	Maes, R.
MICL01314	Symbiotic Infection of Legume Roots by Nitrogen-Fixing Rhizobium	Dazzo, F.
MICL01481	Biodegradation of (Chloro) Aromatic Compounds	Hausinger, R.
MICL01557	Molecular Genetic Regulation of Streptomyces Antibiotics	Champness, W.
MICL01593*	Advanced Technologies for the Genetic Improvement of Poultry	Dodgson, J.
MICL01628	Analysis of the Genes of Marek's Disease Herpesvirus and the Proteins They Encode	Velicer, L.
MICL01629	Lignin Degradation by Basidiomycete Fungi and Applications	Reddy, C.
MICL01681	Molecular Basis of Symbiotic Plant-Microbe Interactions	de Bruijn, F.
MICL01728*	National Animal Genome Research Project	Crittenden, L.
MICL01757	Analysis of Ribosomal RNA Genes and Operons in Microbial Ecology and Evolution	Schmidt, T.
MICL01771	Spatial and Temporal Patterns of C, N and Soil Microbial Communities in Agricultural Soils	Klug, M.
MICL01834	Molecular Mechanisms Involved in the Secretion of Pathogenicity Factors Through Bacterial Membranes	Bagdasarian, M.
MICL01857	Physiology and Phylogenetic Diversity of Termite Gut Symbionts	Breznak, J.
MICL06877	Identification of Infection-Associated Antigens of <i>Actinobacillus pleuropneumonia</i>	Mulks, M.
MICL08159	Infectious Mitochondrial Hypovirulence in <i>Cryphonectria parasitica</i>	Bertrand, H.
MICL08161	The Regulation of Herbicide Degrading Operons in Soil Bacteria	Wright, A.
MICL08163	Bioproduction of Carveol and Perillyl Alcohol From Limonene	Oriel, P.
MICL08165	Urease Structures, Mechanism, and Inhibition	Hausinger, R.
MICL08170	Development of Enterotoxin B Subunit as Carrier of Foreign Antigenic Epitopes	Bagdasarian, M.

Microbiology

(continued)

MICL08175 *In vivo* Expressed Genes of *Actinobacillus pleuropneumoniae* Mulks, M.
 MICL08182 Cloning of an Alternative Oxidase Regulatory Gene From *Neurospora* Bertrand, H.
 MICL08183 Fluorescent Protein Time-Temperature Integrator for Thermal Process Monitoring Merrill, J.



National Food Safety and Toxicology Center

Phone: 432-3100



Robert M. Hollingsworth,
Director

FACULTY

	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Giesy, John P.	12	0.25	0.00	0.75	Aquatic Toxicology
Zacharewski, Timothy R.	14	0.20	0.00	0.80	Biochemical Toxicology
TOTALS:		0.45	0.00	1.55	

PROJECTS

MICL01414 Fates and Effects of Trace Contaminants in Aquatic Systems Giesy, J.
 MICL01849 Environmental Dynamics of Xenobiotics in the Environment and Analytical Methods Development Zabik, M.
 MICL03364 Improved Microbial Food Safety Through Risk Assessment, Management, Communication and Analysis Mather, E.

Packaging

Phone: 355-9580



Bruce R. Harte, Director

FACULTY

	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Clarke, Robert	14	0.50	0.00	0.50	Manufacturing Operations
Downes, Theron W.	12	0.20	0.00	0.80	Packaged Food Quality
Giacin, Jack R.	12	0.59	0.00	0.41	Package Product Interaction
Hernandez, Ruben J.	13	0.25	0.00	0.75	Package Product Interaction
Lee, Julian J. L.	13	0.20	0.00	0.80	CAP/MAP & Protective Packaging
Singh, Sher Paul	13	0.20	0.00	0.80	Distribution/Transportation/ Environmental Measuring/Packaging Dynamics
TOTALS:		1.94	0.00	4.06	

Packaging

PROJECTS

PROJECTS			
MICL01520	Transport Properties of Polymer Films as Related to Quality and Storage Stability of Packaged Products		Graetz, J.
MICL01735	Effect of Packaging on Reducing Physical Damage to Fresh Produce Due to Transport Vibration		Singh, S.
MICL01736	Quality Retention in Packaged Food		Downes, T.
MICL01818	Improving the Quality of Products and Distribution Productivity Through Packaging Innovation		Twede, D.
MICL01831	Design of Plastic Packages for Preserving the Quality and Safety of Food Products		Hernandez, R.
MICL01840	Controlled Atmosphere and Modified Atmosphere Packaging of Fresh Produce		Lee, J.
MICL03321	Improving the Quality of Products and Distribution Productivity Through Packaging Innovation		Twede, D.
MICL03322	Mass Interactions in Solid Polymer/Fluid Phase Systems and Their Relation to Product Quality		Hernandez, R.

Park, Recreation and Tourism Resources

Phone 355-5191



Joseph D. Frdgen, Chair

FACULTY

	PLANT	MASS	MSUE	JOINT	AREA OF INTEREST
Holecek, Donald F.	12	0.75	0.25	0.00	Resource Economics/Tourism
Nelson, Charles M.	13	0.25	0.00	0.75	Natural Resource Management
Propst, Dennis B.	13	0.50	0.00	0.50	Psychology/Planning/Economics
Stynes, Daniel J.	11	0.50	0.00	0.50	System Analysis/Research Methods/Economics
Vander Stoep, Gail A.	14	0.25	0.25	1.50	Communications/Human Dimensions
TOTALS:		2.25	0.50	2.25	

PROJECTS

MICL01763	Influences of Natural Resource Recreation on Land Management in Michigan	Nelson, C.
MICL01766	Social Science and Communications in Outdoor Recreation Resource Management	Vander Stoep, G.
MICL09390	Travel, Tourism and Recreation Resource Center	Holecek, D.
MICL09346	Psychology of Recreation and Tourism	Frdgen, J.
MICL09362	Economic Impacts of Recreational Tourism	Stynes, D.
MICL09000	Development and Implementation of Economic Impact Models	Stynes, D.

Pathology

Phone: 353-9160



Willie M. Reed, Interim Chair

FACULTY		RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Bell, Thomas G.		12	0.25	0.00	0.75	Comparative Pathology/Platelet Function
Harkema, Jack		12	0.31	0.00	0.69	Toxicology
Holland, Margo S.		14	0.30	0.00	0.70	Molecular Pathology
Padgett, George A.		12	0.25	0.00	0.75	Comparative Veterinary Pathology
Patterson, Jon S.		13	0.25	0.00	0.75	Veterinary Pathology/Infectious Disease/Animals
TOTALS:			1.36	0.00	3.64	

PROJECTS

MICL01720	Immunohistochemical Diagnosis of Infectious Diseases	Patterson, J.
MICL01776	Effects of Endotoxin and Other Organic Dust Constituents on Airway Mucous Cells	Harkema, J.
MICL01847	Osteochondrosis: Development of Procedures to Control or Mitigate the Effects of This Disease	Padgett, G.
MICL06882	Hemorrhagic Disorder in Noncytopathic Type II Bovine Virus Diarrhea Viral Infection	Bell, T.

Pesticide Research Center

Phone: 353-9430



FACULTY

	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
DiFonzo, Christina D.	14	0.10	0.40	0.50	Field Crop Entomology/Pesticide Education Coordinator
Edson, Charles E.	13	0.25	0.75	0.00	Acting IPM Coordinator
Zabik, Matthew J.	12	0.84	0.00	0.16	Chemical Fate/Residue Analysis
TOTALS:		1.19	1.15	0.66	



Mark E. Whalon, Acting Director

PROJECTS

MICL01730*	A National Agricultural Program to Clear Pest Control Agents for Minor Uses	Hollingworth, R.
MICL03330	Environmental Dynamics of Xenobiotics in the Environment and Analytical Methods Development	Zabik, M.
MICL07604	Minor Use Animal Drug Program — Headquarters	Hollingworth, R.

Pesticide Research Center

(continued)

MICL07613	NC Region IR-4 Leader Lab Program to Clear Pest Control Agents for Minor Uses	Hollingworth, R.
MICL07614	Michigan's CSREES NAPIAP Program	Olsen, L.
MICL07616	An Integrated Crop Management System to Reduce Pesticide Use in Asparagus Production	Edson, C.
MICL07617	Michigan's CSREES NAPIAP Program - 1997	Olsen, L.
MICL08155	Orchard Floor Management Systems to Reduce Herbicide Use in Deciduous Tree Fruit Production in NC Region	Edson, C.

Physiology

Phone: 355-6475

William S. Spielman,
Chair

FACULTY		RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Dukelow, W. Richard		12	0.40	0.00	0.60	Reproductive Physiology
Jump, Donald B.		12	0.50	0.00	0.50	Molecular Endocrinology
TOTALS:			0.90	0.00	1.10	

PROJECTS

MICL01769	Carbohydrate Recognition in Neuronal Pattern Formation	Zipser, B.
-----------	--	------------

Plant Research Laboratory (MSU-DOE)

Phone: 353-2270

Kenneth Keegstra,
Director

FACULTY		RANK	MAES	MSUE	JOINT	AREA OF INTEREST
de Bruijn, Frans J.		12	0.38	0.00	0.62	Molecular Biology
Howe, Gregg A.		14	0.23	0.00	0.77	Plant/Insect Defense
Walton, Jonathan D.		12	0.23	0.00	0.77	Plant Pathology
TOTALS:			0.84	0.00	2.16	

PROJECTS

MICL08137	Control of mRNA Stability in Dicotyledonous Plants	Green, P.
MICL08147	Regulation of Leghemoglobin (1B) Gene Expression	de Bruijn, F.
MICL08149	Photoperiodic Control of Gibberellin Metabolism in Long-Day Rosette Plants	Zeevaart, J.
MICL08154	Effects of Engineered Plant Respiration on Growth/Yield and Lowered Temperatures	McIntosh, L.
MICL08169	Analysis of Senescence-Inducible Ribonuclease in Tomato	Green, P.
MICL08177	<i>Pseudomonas syringae</i> pv. Tomato Extracellular Proteins Controlled by the Hrp System	He, S.
MICL08178	Control of mRNA Stability in Dicotyledonous Plants	Green, P.
MICL08184	Role of Cell-Wall-Degrading Enzymes in Plant Pathogenesis	Walton, J.
MICL08197	Photoperiodic Control of Gibberellin Metabolism in Long-Day Rosette Plants	Zeevaart, J.

Remote Sensing (Center for)

PROJECTS

Phone: 353-7195

MICL01835 Applications of Spatial Information Technologies to Management of Agriculture and Natural Resources Groop, R.



Resource Development

Phone: 355-3421



Cynthia C. Fridgen, Chair

FACULTY

	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Bingen, R. James	13	0.40	0.00	0.60	International Development
Bronstein, Daniel A.	12	0.40	0.00	0.60	Environmental Policy & Law
Dersch, Eckhart	12	0.25	0.50	0.25	Natural Resources Management
Edens, Thomas C.	12	0.55	0.00	0.45	Resource Economics & Policy
Kakela, Peter J.	12	0.80	0.00	0.20	Natural Resources Management
Norris, Patricia E.	14	0.08	0.20	0.72	Land Use
Rosenbaum, Rene P.	14	0.40	0.00	0.60	Community Economic Development
Schultink, Gerhardus	12	0.50	0.00	0.50	Natural Resources Management
Witter, Scott G.	13	0.30	0.00	0.70	Natural Resources Management
TOTALS:		3.68	0.70	4.62	

PROJECTS

MICL01536	Spatial and Temporal Indicators for Economic Development, Land Use Planning and Environmental Impact	Schultink, G.
MICL01789	Land Transformation in the Rural-Urban Interface	Edens, T.
MICL01817	Watershed Management in the Rural/Urban Fringe	Witter, S.
MICL01851	Water Resource Protection at the Interface of the Hydrologic Cycle and Cultural Influences	Dersch, E.
MICL01860	Pesticide Policy Studies	Bingen, R.
MICL01870	Use of Impact Assessment in Policy Formulation	Bronstein, D.
MICL03318	Water Resource Protection at the Interface of the Hydrologic Cycle and Cultural Influences	Dersch, E.
MICL03352	Mineral Lands Development, Energy Requirements and Environmental Impacts	Kakela, P.
MICL03358	Economic Issues of Latinos in Rural Settings and Their Impact on Michigan Agriculture	Rosenbaum, R.

Small Animal Clinical Sciences

Phone: 355-6570

PROJECTS

MICL06870 Adema Disease and Mechanism of Zinc Absorption in Cattle

Yuzbasiyan-Gurkan, V.

Sociology

Phone: 355-6640



Christopher K. Vanderpool,
Chair

FACULTY	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
Bokemeier, Janet L.	12	0.50	0.00	0.50	Farm Family/Labor Markets
Busch, Lawrence M.	12	0.47	0.00	0.53	Agriscience Structure/Agricultural Research Policy
Harris, Craig K.	13	0.50	0.00	0.50	Sociology of Agriculture
Johnson, Nan E.	12	0.50	0.00	0.50	Demography
Schwarzeweller, Harry K.	12	0.50	0.00	0.50	Sociology of Agriculture
TOTALS:		2.47	0.00	2.53	

PROJECTS

MICL01612	Strategic Analysis of Technical Change in Commodity Subsectors	Busch, L.
MICL01642*	Impacts of Structural Change in the Dairy Industry	Schwarzeweller, H.
MICL01751*	Rural Labor Markets in the Global Economy	Bokemeier, J.
MICL01829*	Rural Restructuring: Causes and Consequences of Globalized Agricultural and Natural Resource Systems	Harris, C.
MICL01842*	Commodities, Consumers, and Communities: Local Food Systems in a Globalizing Environment	Busch, L.
MICL01864	Rural Family Ties and Well-Being: Social Capital, Community Context and Household Strategies	Bokemeier, J.
MICL03337	Work and Family Issues in Rural Michigan Labor Markets	Bokemeier, J.
MICL03339	Rural Migration, Educational Investments, and the Uneven Development of Michigan's Upper Peninsula	Schwarzeweller, H.

Water Research (Institute of)

Phone: 353-3742



Jon F. Bartholic, Director

FACULTY

	RANK	MAES	MSUE	JOINT	AREA OF INTEREST
D'Itri, Frank R.	12	0.10	0.00	0.90	Environmental Recycling
TOTALS:		0.10	0.00	0.90	

PROJECTS

MICL01838	Development of a Knowledge-Based Decision-Support System for Integrated Landscape/Watershed Planning	Bartholic, J.
MICL07626	A Regional Multiagency Partnership for Improving Agriculture and Natural Resources Decisions	Bartholic, J.

GRAND TOTALS

131.56 42.72 132.22

¹Elton Smith Endowed Chair

²C.S. Mott Distinguished Professor of Sustainable Agriculture

³Hannah Professor for Microbial Ecology and Plant Sciences

⁴Nowlin Professor for Water Research (50 percent of the appointment is paid by the endowment)

⁵Clinton Meadows Chair

⁶Partnerships for Ecosystem Research and Management (PERM) positions with salary funded by the Michigan Department of Natural Resources

Futures Magazine

Futures is the quarterly magazine of the Michigan Agricultural Experiment Station (though in 1997, Vol. 15, Nos. 1 and 2 and Vol. 15, Nos. 3 and 4 were combined into one issue). To receive *Futures* free of charge, write to: *Futures* Editor, 310 Agriculture Hall, MSU, East Lansing, MI 48824-1039, call 517-432-1555, or e-mail depolo@msue.msu.edu.

Winter 1997 Vol. 14, No. 4 — Research With An Impact

As a partially state-funded entity, the Michigan Agriculture Experiment Station promotes its programs to citizens and legislators to demonstrate how Michigan tax dollars are being used to improve and enhance agriculture and natural resources and rural development in the state. There are societal expectations that the money will be well spent and address Michigan problems; the MAES is a responsible steward of taxpayers' money. As budgets universally tighten and everyone tries to do more with less, federal and state agencies are also asking funding recipients to describe the impact of funded projects. The questions "Who cares?" and "So what?" are used by many people to judge the impact of research projects.

In this issue of *Futures*, we attempt to answer those questions. Some research impacts are immediately obvious — a new raspberry package that offers consumers higher quality fruit with no added cost is an idea that most people can quickly understand and appreciate. Better berries at the same price. The link between research and a benefit is quite simple. But other research projects take longer to develop and their impacts and applications may be part of a body of work that takes place over many, many years and ultimately brings about a change for the better. On the surface, the MAES' partial funding of the Minority Competitive Doctoral Fellowship may not appear to benefit anyone but the recipient of the fellowship. But by encouraging and supporting young people who are not in the traditional graduate student pool, both the individual student and future generations of students benefit from the larger, more diverse group of talented people that come to make up our universities. Similarly, research on using organic surfactants to create organoclays initially may sound incomprehensible to most of us until we learn that the resulting organoclays can be used to trap and hold toxins that have leaked into the soil. Those polysyllabic mysteries are being used to keep our groundwater safe and drinkable, a concept we can all support.

This issue of *Futures* profiles just a handful of impacts that MAES research has had in Michigan, the United States and the world. Park, recreation and tourism scientists have worked with city planners and other local government officials to supply statistics that helped make a case for a large business to locate in the area, boosting the local economy and creating jobs. Forestry and entomology researchers have developed a precedent-setting management compliance program that ensures Michigan Christmas tree growers will be able to ship their trees anywhere in the country, helping both the environment and the economy. Horticultural scientists discovered a phenomenon that has allowed greenhouse plant growers to meet consumer



demands for the perfect poinsettia or Easter lily precisely and use fewer chemicals in the process. Food science and human nutrition researchers found a way to extract cholesterol from egg yolks while preserving the egg's original flavor properties, creating a more nutritious, better tasting low-cholesterol product. Agricultural engineering scientists conceived and built a machine that separates sand from manure, reducing milk producers' costs and benefiting the environment. The list goes on and on.

As we move toward an era of even greater accountability, the calls for demonstrable impacts will increase in number and volume. Because of its mission and the high caliber of its affiliated scientists, the Michigan Agricultural Experiment Station can answer the questions, "Who cares?" and "So what?" quickly and directly.

Spring/Summer 1997 Vol. 15, Nos. 1 and 2 — Basic Research: The Building Blocks of Science

In scientific research, the easiest experiments to explain are those that have a seemingly immediate application to most people's daily lives. A new variety of apple, a quick and easy test for toxins in foods, a new, healthier salt substitute product — the uses and benefits of all these items are relatively easy to comprehend. This type of work is known as applied research — the outcome of the research has direct, almost immediate applications for a perceived problem.

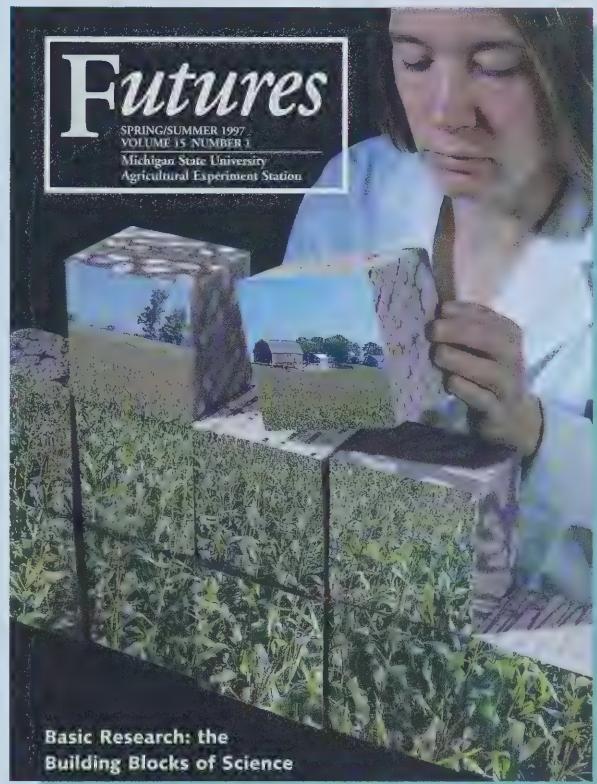
Another category of research being done by Michigan Agricultural Experiment Station scientists is known as basic research. This work is just as important and often takes place at the cellular level. Because basic research tends to be specialized, time consuming and highly technical, its connection to everyday life requires a much more involved explanation.

Basic researchers do work that helps increase the general understanding of processes and properties that are common to a range of organisms or occurrences. Instead of working on projects that have immediate applications for growers or consumers, basic scientists do work that enhances the universal knowledge base and may lead to new applications over a period of years. This issue of *Futures* highlights just a few of the basic research projects being done by MAES faculty members.

For example, the scientific world has long known that malnutrition has a profound effect on the function of the body's immune system. For the past 15 years, MAES microbiology and biochemistry scientist Pamela Fraker has been studying how zinc deficiency affects lymphocyte production in bone marrow. Lymphocytes are white blood cells that fight infection, and when the body doesn't have enough zinc, it elevates levels of a steroid that essentially kills the lymphocytes. Fraker is studying the biological processes that control these actions.

Mike Thomashow, MAES microbiologist and crop and soil scientist, has been working for 10 years on improving cold tolerance in plants. He recently isolated a gene that contributes to cold tolerance and the protein that seems to be the switch that turns the gene on and off. By inserting this gene into canola, he hopes to improve the freezing tolerance of the crop and allow farmers in the upper Midwest and Canada to plant winter canola, which has about a 30 percent higher yield than spring canola.

MAES biologist Richard Lenski, a Hannah professor in the Center for Microbial Ecology, has successfully bred more than 20,000 generations of *E. coli* bacteria to study the processes and test theories of evolution. His work will further the under-



standing of how disease-causing bacteria spread and evolve, leading to more effective treatment.

John Breznak, MAES microbiologist, has been studying termites for more than 20 years. Termites eat and degrade organic resources that other animals can't eat, thanks to the thriving microbial community that lives in their guts. By studying how this microbial gut community works together and with the termite, Breznak hopes to unlock the secrets of some of the termite's amazing recycling abilities and characterize this unique, mutually beneficial relationship.

Though not always highly visible, basic research is the foundation and springboard for many applied research projects. As MAES Director J. Ian Gray has said, "Basic research sustains the generation of knowledge and is used by more problem-oriented scientists to solve industry issues, whether it's this year or 10 years from now. Basic research is a part of those solutions."

MAES Contributors

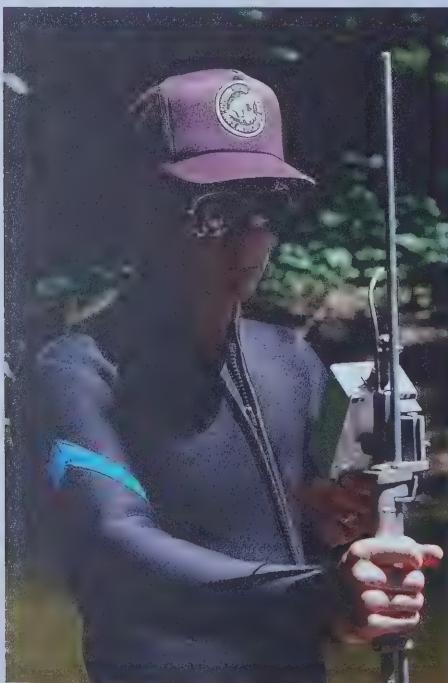
July 1, 1996 to June 30, 1997

3M Canada Company	Center Greenhouse, Inc.
AMVAC Chemical Corporation	Chelsea Milling Company
Abbott Laboratories	Chemical Manufacturers Association
Advanced Seed Technology, Inc.	Cherry Marketing Institute, Inc.
Ag Spectrum Company	Chiquita Brands
AgEvo USA Company	Ciba-Geigy Corporation
Agri Pro Seeds, Inc.	Clackamas Greenhouses, Inc.
Agri Sales, Inc.	Clorox Company
Allen Foundation, Inc.	Consolidated Nutrition, L.C.
American Agricultural Economics Association	Coomer Seeds, Inc.
American Cyanamid Company	Cooperative Elevator Company
American Farm Products, Inc.	Cotton Foundation
American Floral Endowment	Countrymark Cooperative, Inc.
American Meat Institute	County of Saginaw
Amway Corporation	Coutts & Company
Anderson's, Inc.	Curtec of Florida, Inc.
Archer Daniels Midland Company	Dilley, David & Marion
Asgrow Research, SVS	Dominion BioSciences, Inc.
Auxein Corporation	Dow Corning Corporation
BASF Aktiengesellschaft	DowElanco
BASF Corporation	DuPont Agricultural Products
Ball Seed Company	Eastman Kodak Company
Barry County Extension Service	Ecogen, Inc.
Bayer Corporation	Elanco Animal Health
Bedding Plants Foundation, Inc.	Elf Atochem North America, Inc.
BioWorks, Inc.	Elsevier Science Ltd.
Blackmore Company, Inc.	Emmert's Blueberries, Inc.
Bloom Dairy, Inc.	Entek Corporation
Boise Cascade Corporation	Evenflo Products Company, Inc.
Bordine Nursery, Ltd.	FMC Corporation
Brixie, Julia	Farm Credit Services of Michigan's Heartland
C. Raker & Sons, Inc.	Federal Express
Cargill Hybrid Seeds	Fernlea Group of Companies
Celery Research, Inc.	Fine Lawn Research, Inc.

Four Star Greenhouse, Inc.
 Fred C. Gloeckner Foundation, Inc.
 Fremont Pickle & Tomato Growers Association
 GIFAP
 General Mills, Inc.
 Gerber Companies Foundation
 Gerber Products Company
 Glass Corner Greenhouses, Inc.
 Glei's, Inc.
 Gowan Company
 Gratiot County Extension
 Great Lakes Commission
 Great Lakes Fishery Commission
 Green Leaf Enterprises, Inc.
 Greg Orchards & Produce, Inc.
 Griffin Corporation
 Grower Service
 Growmark, Inc.
 Gustafson, Inc.
 Hamilton Farm Bureau
 Hanson Cold Storage Company
 Harrington Seeds, Inc.
 Harris Moran Seed Company
 Health Science Research Foundation
 Heinz U.S.A.
 Henry Mast Greenhouses, Inc.
 Huron Mountain Wildlife Foundation
 ISK Biosciences Corporation
 Intervet, Inc.
 Iowa State University
 Ivy Acres, Inc.
 JEFO Nutrition, Inc.
 Jack Brown Produce, Inc.
 Kalamazoo Valley Plant Growers Co-op
 Kellogg Company
 Kellogg Corporate Citizenship Fund
 Kent County
 King Milling Company
 Knappen Milling Company
 Kraft Foods
 Lakeside States, Inc.
 Land O'Lakes, Inc.
 Landis International, Inc.
 Lansing Grain Company
 Laporte Water Technologies & Biochem, Inc.
 Levelvue Pork Shop
 Life Sciences Research Foundation
 M&M Mars
 MBG Marketing



Memphis Zoological Society
Mennel Milling Company
Merck & Company, Inc.
Micandy Garden Greenhouses, Inc.
Michigan Agricultural Commodities, Inc.
Michigan Agricultural Cooperative Marketing Association, Inc.
Michigan Apple Committee
Michigan Apple Research Committee
Michigan Asparagus Research, Inc.
Michigan Bean Commission PRAB
Michigan Biotechnology Institute
Michigan Carrot Committee
Michigan Celery Promotion Cooperative, Inc.
Michigan Christmas Tree Association
Michigan Corn Marketing Committee
Michigan Crop Improvement Association
Michigan Department of Agriculture
Michigan Department of Education
Michigan Department of Natural Resources
Michigan Department of Transportation
Michigan Forestry & Park Association
Michigan Foundation Seed Association, Inc.
Michigan Hay & Forage Council
Michigan Nursery & Landscape Association
Michigan Nut Growers Association
Michigan Onion Committee
Michigan Peach Sponsors
Michigan Pear Research Association
Michigan Potato Industry Commission
Michigan Processing Apple Growers
Michigan Soybean Promotion Committee
Michigan State Horticultural Society
Michigan State Millers' Association
Michigan Sugar Company
Michigan Turfgrass Foundation
Michigan Vegetable Council, Inc.
Mid America Food Processors Association
Midwest Poultry Services L.P.
Milliken Chemicals
Mink Farmers Research Foundation
Molbak's, Inc.
Monitor Sugar Company
Monsanto Company
Muscular Dystrophy Association
Mycogen Corporation
National Cattlemen's Beef Association
National Dairy Council
National Grape Cooperative Association, Inc.
National Honey Board
National Institutes of Health



National Pork Producers Council

National Science Foundation

National University of LaPlata

Natural Product Technologies

Nature Conservancy

NatureMark

Neal Mast & Son Greenhouses, Inc.

Neogen Corporation

North American Strawberry Growers Research Foundation, Inc.

Novartis Crop Protection, Inc.

O.J. Noer Research Foundation, Inc.

Ocean Organics Corporation

Ohio State University Research Foundation

Ottawa County Extension Service

Owens-Illinois, Inc.

Parrish & Heimbecker, Inc.

Pfizer, Inc.

Phoebe W. Haas Charitable Trust

Pickle Packers International, Inc.

Pillsbury Company

Pioneer Hi-Bred International, Inc.

Post Gardens of Battle Creek, Inc.

Prince Agri Products, Inc.

Protein Technologies International

Public Health Service

Purdue University

Pursell Technologies Inc.

QVC, Inc.

Rain & Hail L.L.C.

Ralston Purina Company

Regal Chemical Company

Rhone-Poulenc Ag Company

Riveridge Produce Marketing Company

Rohm & Haas Company

Ross Products Division

Roy F. Weston, Inc.

Saatzucht Steinach GmbH

Saginaw Country Club, Inc.

Saginaw County Mosquito Abatement Commission

Sandoz Agro, Inc.

Sankyo Company, Ltd.

Service Chemicals (North America), Ltd.

Shiawassee County Extension Service

Smith Gardens, Inc.

Snack Food Association

Somero Enterprises, Inc.

Sonnyside Flowers

Southern Illinois University

SportGrass, Inc.

Stacy's Greenhouses

Star of the West Milling Company

Stewart Seeds, Inc.

Stokes Seeds, Inc.

Strathayr Pty, Ltd.

Taiwan Government

Terra Industries, Inc.

Toro Company

Tropicana Products, Inc.

TruGreen ChemLawn

Twixwood Nursery

U.S. Agency for International Development

U.S. Department of Agriculture

U.S. Department of Energy

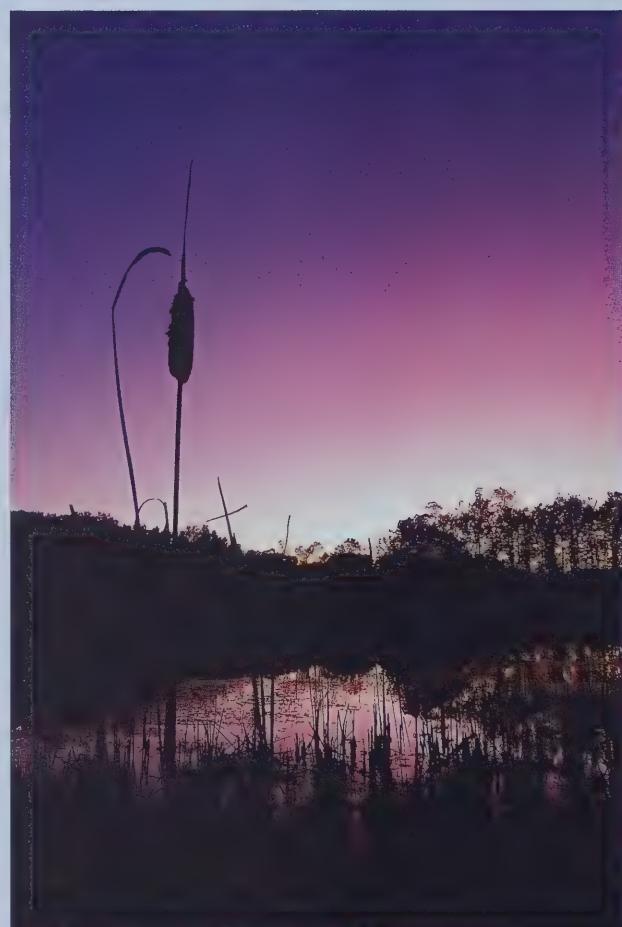
U.S. Department of the Interior

U.S. Department of the Interior Bureau of Reclamation

U.S. Department of the Interior Fisheries & Wildlife Services

U.S. Department of the Interior Geological Survey
U.S. Environmental Protection Agency
U.S. Food and Drug Administration
U.S. Golf Association Foundation, Inc.
U.S. Treasury
U.S.D.A. Agricultural Research Service
U.S.D.A. Cooperative State Research, Education, & Extension Services
U.S.D.A. Economic Research Service
U.S.D.A. Forest Service
U.S.D.A. Natural Resources Conservation Service
U.S.D.A. Office of International Cooperative Development
UPS General Service Company
Uniroyal Chemical Company
United Agri Products
University of Delaware
University of Guelph
University of Michigan
University of Minnesota
University of Nebraska
University of Saskatchewan
University of Tennessee
University of Wisconsin
Urbana Laboratories
VAUGHAN'S Seed Company
Valent U.S.A. Corporation
Viridian, Inc.
Viskase Corporation
W.A. Cleary Corporation
W.K. Kellogg Foundation
WMC Products, Inc.
Walters Gardens, Inc.
Ward's Natural Science Establishment, Inc.

Washington Tree Fruit Research Commission
Western Michigan Greenhouse Association
Wilbur-Ellis Company
William Beaumont Hospital
Wolf-Tec International, Inc.
Zanotti S.P.A.



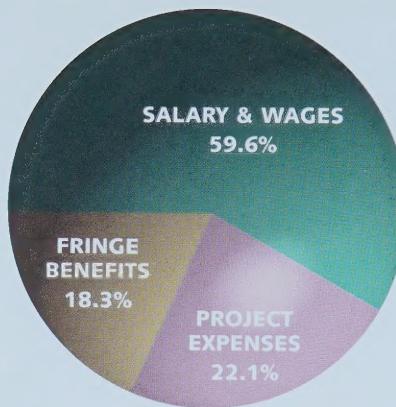
Zeneca, Inc.
Zinpro Corporation

Financial Report

July 1, 1996 to June 30, 1997

47

DISTRIBUTION OF APPROPRIATED FUNDS



INCOME:

Federal Appropriations \$4,854,897

Hatch	\$3,679,126
McIntire-Stennis	\$197,867
Hatch RRF	\$914,256
Animal Health and Disease, Section 1433	\$63,648

State Appropriations \$28,784,622

TOTAL APPROPRIATIONS: \$33,639,519

Grants — Federal, State and Private \$28,753,170

\$62,392,689

EXPENSES:

\$62,392,689

Salaries	\$20,046,448
Fringe Benefits	\$6,148,384
Project Expenses	\$7,444,687
Grants — Federal, State and Private*	\$28,753,170

Personnel

(Full-time Equivalents Funded From Appropriated Funds)

Research Staff**

Professors	78.86
Associate Professors	28.77
Assistant Professors	20.31
Research Associates and Specialists	25.53

153.47

Support Staff

Administrative Professionals	71.27
Supervisors	25.08
Clerical	43.88
Technicians	12.06

152.29

* Grants are reported using most recent 5 year average

** Does not include department chairpersons/unit administrators

US2MI SU20 A56
1997
Michigan State
University.
Annual report of The
Agricultural Experiment

MICHIGAN AGRICULTURAL EXPERIMENT STATION

J. Ian Gray, Director

109 Agriculture Hall

Michigan State University

East Lansing, Michigan 48824-1039



SR-91, February 1998

The Michigan State University Agricultural Experiment Station is an equal opportunity employer and complies with Title VI of the Civil Rights Act of 1964 and Title XI of the Education Amendments of 1972.